State Form 4336

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

INDIANAPOLIS

OFFICE MEMORANDUM

Date: Draft (June 8, 2010)

To: Matthew Carmichael
Industrial Permits Section

From: John Elliott
Permits Branch

Subject: Wasteload Allocation Report for U.S. Steel - Midwest Plant in Porter County (IN0000337, WLA000062)

Reasonable potential and antidegradation analyses for individual toxic pollutants were done for the renewal of the NPDES permit for U.S. Steel - Midwest Plant (formerly National Steel, Midwest Division). The analyses were done for Outfalls 002, 003 and 004. In addition, a reasonable potential analysis for whole effluent toxicity (WET) was done for Outfall 004 and the thermal effluent requirements in the current permit for Outfalls 002, 003 and 004 were reviewed. Outfalls 002 and 003 consist of noncontact cooling water and stormwater while Outfall 004 consists of noncontact cooling water, stormwater and treated process wastewater (the treated process wastewater is regulated through internal Outfall 104). The discharge through each outfall is to Portage-Burns Waterway, a tributary to the Indiana portion of the open waters of Lake Michigan. Therefore, the discharge through each outfall is covered under the rules for the Great Lakes system. The effluent flows used in the analyses were 7.08 mgd for Outfall 002, 18.7 mgd for Outfall 003 and 43.8 mgd for Outfall 004.

Portage-Burns Waterway is designated for full-body contact recreation and shall be capable of supporting a well-balanced, warm water aquatic community. The East Branch of Little Calumet River and its tributaries downstream to Lake Michigan via Burns Ditch (Portage-Burns Waterway) are designated in 327 IAC 2-1.5-5(a)(3)(B) as salmonid waters and shall be capable of supporting a salmonid fishery. The Indiana portion of the open waters of Lake Michigan is designated in 327 IAC 2-1.5-19(b)(2) as an outstanding state resource water (OSRW). Discharges to tributaries of OSRWs are subject to the antidegradation implementation procedure for OSRWs in 327 IAC 5-2-11.7(a)(2).

The 2008 assessment unit for Portage-Burns Waterway is INC0164_T1108. This assessment unit is on the 2008 303(d) list for PCBs in fish tissue. The Lake Michigan shoreline is on the 2008 303(d) list for mercury and PCBs in fish tissue. A TMDL for *E. coli* for Portage-Burns Waterway (assessment unit INC0164_T1108) was approved by U.S. EPA January 28, 2005 and is part of the Little Calumet/Burns Ditch TMDL. The TMDL requires load reductions from nonpoint sources, but not from point source discharges. The TMDL does not require permit limits for *E. coli* for Outfall 002, 003 or 004. A TMDL for *E. coli* for the Lake Michigan shoreline was approved by U.S. EPA September 1, 2004 and is part of the Lake Michigan TMDL.

The stream design flows used in the wasteload allocation analysis were calculated using daily mean flow data reported at USGS gaging station 04095090 Burns Ditch at Portage. This station is located at the bridge upstream of Outfall 002. The three outfalls are located approximately 0.06 miles (004), 0.4 miles (003) and 0.6 miles (002) upstream of Lake Michigan on the east bank of Portage-Burns Waterway. Daily mean flow data approved by the USGS are available for this station for the period October 1, 1994 through September 30, 2007. The U.S. EPA program DFLOW was used to calculate stream design flows using the daily mean flow data. The Q7,10 at the gage is 110 cfs.

The facility adds chlorine to their intake water to control zebra mussels and the current permit includes limits for total residual chlorine at Outfalls 002, 003 and 004. Therefore, a reasonable potential analysis was done under 5-2-11.5(a) and it was determined that water quality-based effluent limitations (WQBELs) for total residual chlorine are required for Outfalls 002, 003 and 004. A reasonable potential analysis for Outfalls 002 and 003 was done for pollutants of concern other than total residual chlorine in accordance with the provision for discharges of once-through noncontact cooling water in 327 IAC 5-2-11.5(g). The results of the analysis show that there is no reasonable potential to exceed for any of the pollutants of concern considered in the analysis. In accordance with 5-2-11.5(g)(6), it is assumed that the stormwater discharges to Outfalls 002 and 003 will be regulated as if they discharged directly to Portage-Burns Waterway and will receive requirements consistent with other stormwater discharges.

A reasonable potential analysis for Outfall 004 was done for pollutants of concern other than total residual chlorine in accordance with the reasonable potential statistical procedure in 327 IAC 5-2-11.5(b). The effluent data available to conduct the reasonable potential analysis consist of a limited number of data points provided as part of the permit renewal application. The data were collected in 1994, 2001, 2008, 2009 and 2010. The facility monitors their treated process wastewater at internal Outfall 104 for many of the pollutants of concern at Outfall 004. Data collected at internal Outfall 104 were used in a separate, conservative test of reasonable potential for Outfall 004 due to a limited data set at Outfall 004. It is considered conservative because the available data show that the pollutant concentrations at Outfall 004 are lower than those at internal Outfall 104 due to the addition of noncontact cooling water to Outfall 004.

The calculation of the monthly average and daily maximum projected effluent quality (PEQ) for individual toxic pollutants using data collected at Outfall 004 is included in Table 1. The results of the reasonable potential procedure are included in Table 2 and they show that there is a reasonable potential to exceed for silver and free cyanide. The calculation of the monthly average and daily maximum PEQ for chloride, fluoride and sulfate using data collected at internal Outfall 104 is included in Table 3. The results are included in Table 4 and they show that there is no reasonable potential to exceed for chloride, fluoride or sulfate.

A PEQ exceeded a PEL in Table 2 because a high multiplying factor was used to calculate the PEQ due to a limited data set. In no case did an effluent sample with a quantifiable value exceed a PEL. Even though reasonable potential for silver and free cyanide are based on limited data sets, WQBELs are still required based on 5-2-11.5(b). However, it is recommended that the facility be allowed to request a review of reasonable potential after more data are collected. The data should be collected at a minimum frequency of two times per month and for a minimum duration of ten months. This will allow monthly averages and a coefficient of variation to be calculated.

The WQBELs for total residual chlorine for Outfalls 002, 003 and 004 are included in Tables 5, 6, and 7, respectively. Considering the location of the three outfalls, the flows from the three outfalls were combined in the calculation of WQBELs for total residual chlorine. Water quality-based effluent limitations for silver and free cyanide at Outfall 004 are included in Table 7 based on the results of the reasonable potential analysis. Water quality-based effluent limitations for the pollutants of concern that are regulated by Federal Effluent Limitation Guidelines at internal Outfall 104 are included for Outfall 004 in Table 7. Although the reasonable potential analysis for these pollutants of concern, except silver, at Outfall 004 showed that there was no reasonable potential based on the statistical procedure in 5-2-11.5(b), the WQBELs are being provided for comparison to technology-based effluent limitations that apply to internal Outfall 104.

A reasonable potential analysis for Outfall 004 for WET was done in accordance with the Federal Great Lakes Guidance in 40 CFR Part 132. U.S. EPA overpromulgated Indiana's reasonable potential procedure for WET in 327 IAC 5-2-11.5(c)(1) and Indiana is now required to apply specific portions of the Federal Great Lakes Guidance when conducting reasonable potential analyses for WET. Indiana's requirements are included under 40 CFR Part 132.6. The results of the reasonable potential analysis for WET show that the discharge from Outfall 004 has a reasonable potential to exceed the numeric interpretation of the narrative criterion for chronic WET. Therefore, WQBELs are required for WET.

Once a determination is made that WQBELs are required for WET, the WQBELs are established in accordance with 327 IAC 5-2-11.6(d). This provision allows a case-by-case determination of whether to establish a WQBEL for only acute or chronic WET, or WQBELs for both acute and chronic WET, the number of species required for testing and the particular species required for testing. The purpose of this WLA report is not to make these determinations, but to provide the numerical limits. The numerical limits for acute and chronic WET are included in Table 7.

Antidegradation for discharges to tributaries of OSRWs under 327 IAC 5-2-11.7(a)(2) was considered for this discharge. New mass limits for total residual chlorine are required for Outfalls 002, 003 and 004. New mass and concentration limits for silver and free cyanide are required for Outfall 004. According to 5-2-11.7(a)(2), for a new or increased discharge of a pollutant or pollutant parameter from a new or existing Great Lakes discharger into a tributary of an OSRW for which a new or increased permit limit would be required, the following apply:

(1) 5-2-11.3(a) and 5-2-11.3(b) apply to the new or increased discharge; and
(2) the discharge shall not cause a significant lowering of water quality in the OSRW.

The provisions under 5-2-11.3(b) were applied to the new limits for total residual chlorine, silver and free cyanide. The new limits for total residual chlorine, silver and free cyanide were determined to not cause a significant lowering of water quality in Portage-Burns Waterway under 5-2-11.3(b)(1)(B).

According to nonrule policy document Water-002-NPD, "Antidegradation Requirements for Outstanding State Resource Waters Inside the Great Lakes Basin," if a new or increased discharge into a tributary of an OSRW does not cause a significant lowering of water quality in the tributary, as determined under 5-2-11.3(b)(1)(A) or 5-2-11.3(b)(1)(B), it will not cause a significant lowering of water quality in the OSRW. It was determined that the new limits for total residual chlorine, silver and free cyanide do not cause a significant lowering of water quality in Portage-Burns Waterway under 5-2-11.3(b)(1)(B). Therefore, they do not cause a significant lowering of water quality in Lake Michigan.

The thermal effluent requirements in the current permit were also reviewed to determine if they are protective of water quality in Portage-Burns Waterway. The current permit was issued in 1990 and includes thermal effluent requirements for the combined effect of Outfalls 002, 003 and 004. The requirements are based on temperature criteria that applied prior to the 1990 change in water quality standards. Prior to 1990, Portage-Burns Waterway was considered a migration route for salmonids and additional temperature criteria protective of salmonids applied. The current permit includes temperature criteria for migration routes for those months where they are more stringent than criteria that apply to a warm water aquatic community.

Portage-Burns Waterway is now designated as a salmonid water and the temperature criteria in 2-1.5-8(d) for cold water fish apply. These criteria are more stringent than those for salmonid migration routes and include criteria for periods when salmonid spawning or imprinting occur. Based on discussions with the Department of Natural Resources, IDEM has defined the period of spawning and imprinting as September through May and the criteria are applied throughout the watershed as spawning and imprinting can occur at any place in the watershed. Therefore, the temperature limits in the current permit should be updated to include the more stringent of the temperature criteria for cold water fish in 2-1.5-8(d) or for a warm water aquatic community in 2-1.5-8(c)(4).

Compliance with the current thermal requirements is determined using a model developed by the facility in 1991 that calculates the temperature rise at the edge of the mixing zone for each outfall. A review of the model is included in the attached documentation. Based on the review, it is recommended that the current model no longer be considered sufficient to determine compliance with the temperature limits in the permit. The following recommendations are provided to assist in the development of a new means of determining the compliance of the discharges from Outfalls 002, 003 and 004 with the thermal requirements:

(1) If technically feasible, the best option is to install a temperature monitoring device in Portage-Burns Waterway at the edge of the mixing zone. Based on the IDEM policy of allowing one-half the stream for thermal mixing zones, an appropriate thermal mixing zone for Outfalls 002, 003 and 004 would extend along Portage-Burns Waterway from Outfall 002 to mid-stream and then downstream to a point at mid-stream and downstream of Outfall 004. The distance from Outfall 004 to the mouth of Portage-Burns Waterway is about 350 feet. Considering the width of Portage-Burns Waterway, a mid-stream point about 300 feet downstream of Outfall 004 could be considered the edge of the mixing zone. A temperature monitoring device would be installed at this point.

(2) The modeling of thermal mixing zones has advanced significantly since the current model was developed in 1991. The USGS installed a flow gage upstream of Outfall 002 in 1994 and long-term temperature data upstream of Outfall 002 and for the specific outfalls are available. In addition, instrumentation is available to monitor the dynamic flow regime in Portage-Burns Waterway to determine the frequency of reverse flows in the vicinity of the outfalls. Therefore, it should now be possible to do a more sophisticated analysis to determine the impact of Outfalls 002, 003 and 004 on the temperature of Portage-Burns Waterway and to develop a more refined model.

The documentation of the wasteload allocation analysis is included as an attachment.

TABLE 1
Calculation of Projected Effluent Quality Using Outfall 004 Data
For U.S. Steel - Midwest Plant Outfall 004 in Porter County
(IN0000337, WLA000062)

Parameter	Monthly Average PEQ					Daily Maximum PEQ				
	Maximum Monthly Average (mg/l)	Number of Monthly Averages	CV	Multiplying Factor	Monthly Average PEQ (mg/l)	Maximum Daily Sample (mg/l)	Number of Daily Samples	CV	Multiplying Factor	Daily Maximum PEQ (mg/l)
Antimony					0.012	0.0019	1	0.6	6.2	0.012
Arsenic III					0.015	0.0024	1	0.6	6.2	0.015
Barium					0.062	0.01	1	0.6	6.2	0.062
Beryllium					0.031	0.005	1	0.6	6.2	0.031
Cadmium	0.000055	1	0.6	6.2	0.00034	0.00023	4	0.6	2.6	0.0006
Chromium (VI)	0.00062	1	0.6	6.2	0.0038	0.00086	4	0.6	2.6	0.0022
Total Chromium	0.009	1	0.6	6.2	0.056	0.23	6	0.6	2.1	0.48
Cobalt					0.012	0.002	1	0.6	6.2	0.012
Copper	0.0014	1	0.6	6.2	0.0087	0.0017	4	0.6	2.6	0.0044
Lead	0.00024	1	0.6	6.2	0.0015	0.00026	4	0.6	2.6	0.00068
Manganese					0.62	0.1	1	0.6	6.2	0.62
Mercury	0.00000058	10	0.4	1.5	0.00000087	0.0000006	22	0.5	1.3	0.00000078
Molybdenum					0.062	0.01	1	0.6	6.2	0.062
Nickel	0.0027	1	0.6	6.2	0.017	0.13	6	0.6	2.1	0.27
Selenium	0.00027	1	0.6	6.2	0.0017	0.00038	4	0.6	2.6	0.00099
Silver	0.00005	1	0.6	6.2	0.00031	0.00005	3	0.6	3.0	0.00015
Thallium					0.0038	0.00062	1	0.6	6.2	0.0038
Tin					0.12	0.02	1	0.6	6.2	0.12
Titanium					0.062	0.01	1	0.6	6.2	0.062
Zinc	0.0062	1	0.6	6.2	0.038	0.075	6	0.6	2.1	0.16
Ethylbenzene					0.019	0.005	2	0.6	3.8	0.019
Naphthalene	0.0001	1	0.6	6.2	0.00062	0.00011	4	0.6	2.6	0.00029
Phenol					0.038	0.01	2	0.6	3.8	0.038
Tetrachloroethylene	0.00024	1	0.6	6.2	0.0015	0.00024	4	0.6	2.6	0.00062
Toluene					0.019	0.005	2	0.6	3.8	0.019
1,1,1-Trichloroethane					0.019	0.005	2	0.6	3.8	0.019
Boron					0.19	0.03	1	0.6	6.2	0.19
Cyanide, Free	0.0024	1	0.6	6.2	0.015	0.0033	4	0.6	2.6	0.0086
Cyanide, Total	0.0022	1	0.6	6.2	0.014	0.0022	4	0.6	2.6	0.0057
Total Ammonia (as N)										
Summer					0.23	0.061	2	0.6	3.8	0.23
Winter					0.23	0.061	2	0.6	3.8	0.23

TABLE 2
Results of Reasonable Potential Statistical Procedure Using Outfall 004 Data
For U.S. Steel - Midwest Plant Outfall 004 in Porter County
(IN0000337, WLA000062)

Parameter	Monthly Average Comparison			Daily Maximum Comparison			WQBELs Required Based on 327 IAC 5-2-11.5(b)?
	Monthly Average PEQ (mg/l)	Monthly Average PEL (mg/l)	PEQ > PEL?	Daily Maximum PEQ (mg/l)	Daily Maximum PEL (mg/l)	PEQ > PEL?	
Antimony	0.012	0.099	No	0.012	0.20	No	No
Arsenic III	0.015	0.18	No	0.015	0.37	No	No
Barium	0.062	1.5	No	0.062	3.1	No	No
Beryllium	0.031	0.037	No	0.031	0.074	No	No
Cadmium	0.00034	0.0077	No	0.0006	0.013	No	No
Chromium (VI)	0.0038	0.014	No	0.0022	0.027	No	No
Total Chromium	0.056	0.26	No	0.48	0.51	No	No
Cobalt	0.012	0.023	No	0.012	0.047	No	No
Copper	0.0087	0.030	No	0.0044	0.052	No	No
Lead	0.0015	0.028	No	0.00068	0.055	No	No
Manganese	0.62	1.5	No	0.62	3.1	No	No
Mercury	0.00000087	0.0000013	No	0.00000078	0.0000032	No	No
Molybdenum	0.062	0.99	No	0.062	2.0	No	No
Nickel	0.017	0.15	No	0.27	0.30	No	No
Selenium	0.0017	0.0057	No	0.00099	0.012	No	No
Silver	0.00031	0.000076	Yes	0.00015	0.00013	Yes	Yes
Thallium	0.0038	0.0074	No	0.0038	0.015	No	No
Tin	0.12	0.17	No	0.12	0.34	No	No
Titanium	0.062	3.1	No	0.062	6.2	No	No
Zinc	0.038	0.27	No	0.16	0.55	No	No
Ethylbenzene	0.019	0.14	No	0.019	0.27	No	No
Naphthalene	0.00062	0.032	No	0.00029	0.065	No	No
Phenol	0.038	0.22	No	0.038	0.45	No	No
Tetrachloroethylene	0.0015	0.074	No	0.00062	0.15	No	No
Toluene	0.019	0.12	No	0.019	0.23	No	No
1,1,1-Trichloroethane	0.019	0.51	No	0.019	1.0	No	No
Boron	0.19	2.0	No	0.19	3.9	No	No
Cyanide, Free	0.015	0.0075	Yes	0.0086	0.013	No	Yes
Cyanide, Total	0.014	116	No	0.0057	281	No	No
Total Ammonia (as N)							
Summer	0.23	1.5	No	0.23	3.1	No	No
Winter	0.23	1.6	No	0.23	3.2	No	No

TABLE 3
Calculation of Projected Effluent Quality Using Internal Outfall 104 Data For U.S. Steel - Midwest Plant Outfall 004 in Porter County (IN0000337, WLA000062)

Parameter	Monthly Average PEQ					Daily Maximum PEQ				
	Maximum Monthly Average (mg/l)	Number of Monthly Averages	CV	Multiplying Factor	Monthly Average PEQ (mg/l)	Maximum Daily Sample (mg/l)	Number of Daily Samples	CV	Multiplying Factor	Daily Maximum PEQ (mg/l)
Chloride	166	36	0.2	1.0	166	188	157	0.2	1.0	188
Sulfate	290	36	0.2	1.0	290	357	156	0.2	1.0	357
Fluoride	0.31	36	0.1	1.0	0.31	0.47	157	0.2	1.0	0.47

TABLE 4
Results of Reasonable Potential Statistical Procedure Using Internal Outfall 104 Data For U.S. Steel - Midwest Plant Outfall 004 in Porter County (IN0000337, WLA000062)

Parameter	Monthly Average Comparison			Daily Maximum Comparison			WQBELs Required Based on 327 IAC 5-2-11.5(b)?
	Monthly Average PEQ (mg/l)	Monthly Average PEL (mg/l)	PEQ > PEL?	Daily Maximum PEQ (mg/l)	Daily Maximum PEL (mg/l)	PEQ > PEL?	
Chloride	166	257	No	188	516	No	No
Sulfate	290	514	No	357	1032	No	No
Fluoride	0.31	1.7	No	0.47	3.5	No	No

TABLE 5
Water Quality-based Effluent Limitations
For U.S. Steel - Midwest Plant Outfall 002 in Porter County
(IN0000337, WLA000062)

Parameter	Quality or Concentration			Quantity or Loading*			Samples/Month
	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	
Chlorine (total residual)	0.01	0.02	mg/l	0.59	1.2	lbs/day	4

*Based on an effluent flow of 7.08 mgd.

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TABLE 6
Water Quality-based Effluent Limitations
For U.S. Steel - Midwest Plant Outfall 003 in Porter County
(IN0000337, WLA000062)

Parameter	Quality or Concentration			Quantity or Loading*			Samples/Month
	Monthly Average	Daily Maximum	Units	Monthly Average	Daily Maximum	Units	
Chlorine (total residual)	0.01	0.02	mg/l	1.6	3.1	lbs/day	4

*Based on an effluent flow of 18.7 mgd.

TABLE 7
Water Quality-based Effluent Limitations
For U.S. Steel - Midwest Plant Outfall 004 in Porter County
(IN0000337, WLA000062)

Parameter	Quality or Concentration Monthly Average	Daily Maximum	Units	Quantity or Loading* Monthly Average	Daily Maximum	Units	Monthly Sampling Frequency
Cadmium	0.0077	0.013	mg/l	2.8	4.8	lbs/day	2
Chromium (VI)	0.014	0.027	mg/l	5.1	9.9	lbs/day	4
Total Chromium	0.26	0.51	mg/l	93	187	lbs/day	4
Copper	0.030	0.052	mg/l	11	19	lbs/day	2
Lead	0.028	0.055	mg/l	10	20	lbs/day	4
Nickel	0.15	0.30	mg/l	55	110	lbs/day	4
Silver	0.000076	0.00013	mg/l	0.028	0.048	lbs/day	2
Zinc	0.27	0.55	mg/l	99	201	lbs/day	4
Naphthalene	0.032	0.065	mg/l	12	24	lbs/day	4
Tetrachloroethylene	0.074	0.15	mg/l	27	55	lbs/day	4
Chlorine (total residual)	0.01	0.02	mg/l	3.7	7.3	lbs/day	4
Cyanide, Free	0.0075	0.013	mg/l	2.7	4.8	lbs/day	2
Cyanide, Total	116	281	mg/l	42401	102714	lbs/day	4
Whole Effluent Toxicity							
Acute		1.0	TUa				
Chronic	1.5		TUc				

*Based on an effluent flow of 43.8 mgd.

Documentation of Wasteload Allocation Analysis
For Discharges to the Great Lakes System

Analysis By: John Elliott
Date: Draft (June 8, 2010)
WLA Number: 62

Facility Information

- **Name:** U.S. Steel - Midwest Plant (formerly National Steel, Midwest Division)
- **NPDES Permit Number:** IN0000337
- **Permit Expiration Date:** March 31, 1995
- **County:** Porter
- **Purpose of Analysis:** Permit Renewal

Outfall 001

- **Facility Operations:** stormwater runoff
- **Current Permitted Flow:** an average flow of 0.013 mgd is given in the permit Fact Sheet
- **Type of Treatment:** none
- **Effluent Flow:** The highest monthly average flow from October 2006 through September 2008 was 0.199 mgd and occurred during February 2007 (see Attachment 1). The February 10, 2009 permit application update lists an average flow of 0.27 mgd.

Outfall 002

- **Facility Operations:** stormwater runoff and noncontact cooling water for bearings
- **Current Permitted Flow:** an average flow of 2.3 mgd is given in the permit Fact Sheet
- **Type of Treatment:** none
- **Effluent Flow:** 7.08 mgd (The highest monthly average flow from October 2006 through September 2008 was 7.08 mgd and occurred during November 2006. The February 10, 2009 permit application update lists an average flow of 8.44 mgd.)

Outfall 003

- **Facility Operations:** stormwater runoff and noncontact cooling water for air, gas and oil coolers
- **Current Permitted Flow:** an average flow of 7.23 mgd is given in the permit Fact Sheet
- **Type of Treatment:** none
- **Effluent Flow:** 18.7 mgd (The highest monthly average flow from October 2006 through September 2008 was 18.7 mgd and occurred during January 2007. The February 10, 2009 permit application update lists an average flow of 29.8 mgd.)

- **Current Effluent Limits (Outfalls 001, 002 and 003):**

Pollutant	Monthly Average		Daily Maximum	
	(mg/l)	(lbs/day)	(mg/l)	(lbs/day)
Oil & Grease	Report	--	Report	--

Outfall 004

- **Facility Operations:** internal Outfall 104, noncontact cooling water for air, gas and oil coolers and stormwater runoff
- **Applicable Effluent Guidelines:** only those that apply to internal Outfall 104
- **Current Permitted Flow:** an average flow of 19.2 mgd is given in the permit Fact Sheet
- **Type of Treatment:** none besides the treatment for internal Outfall 104
- **Current Effluent Limits:** (In addition to the limits below, biomonitoring is required for this outfall. The acute toxicity reduction evaluation (TRE) trigger is an LC50 of less than 100% effluent and the chronic TRE trigger is an NOEL of less than 17.23% effluent.)

Pollutant	Monthly Average		Daily Maximum	
	(mg/l)	(lbs/day)	(mg/l)	(lbs/day)
Oil & Grease	Report	--	Report	--
TSS	Report	Report	Report	Report
BOD5	Report	Report	Report	Report

- **Effluent Flow for WLA Analysis:** 43.8 mgd (The highest monthly average flow from October 2006 through September 2008 was 43.8 mgd and occurred during August 2007. The monthly average flow from outfall 104 during this month was 8.49 mgd. The February 10, 2009 permit application update lists an average flow of 64.7 mgd.)

Internal Outfall 104

- **Facility Operations:** pickle lines, two cold reduction mills, annealing line, sheet temper mill, two cleaning lines, two tin temper mills, two preparation lines, two electroplating lines, two hot-dip coating lines, three shear lines and galvanizing
- **Applicable Effluent Guidelines:** 40 CFR Part 420 Iron and Steel Manufacturing Point Source Category for acid pickling, cold rolling, alkaline cleaning and hot coating operations and 40 CFR Part 433 Metal Finishing Point Source Category for tin and chromium electroplating operations. The pollutants covered include cadmium, total chromium, hexavalent chromium, copper, total cyanide, lead, nickel, silver, zinc, naphthalene and tetrachloroethylene.

- **Current Permitted Flow:** an average flow of 5.88 mgd is given in the permit Fact Sheet; it appears from the permit Fact Sheet that mass limits based on the Outfall 004 average flow of 19.2 mgd were calculated using water quality criteria and compared to existing mass limits and those based on effluent limitation guidelines; this resulted in the mass limits for lead and total cyanide being based on water quality criteria and an effluent flow of 19.2 mgd
- **Type of Treatment:** pretreatment (flow equalization, mixing and API oil separation), chrome treatment (chemical treatment and mixing) and final wastewater treatment (flow equalization, skimming, mixing, flocculation and sedimentation)
- **Current Effluent Limits:**

Pollutant	Monthly Average		Daily Maximum	
	(mg/l)	(lbs/day)	(mg/l)	(lbs/day)
TSS	--	1,147	--	2,290
Oil & Grease	--	--	--	765
Iron	Report	38	Report	138
Total Chromium	Report	10	Report	30
Zinc	Report	10	Report	30
Lead	Report	5.9	Report	13.73
Total Cyanide	Report	3.41	Report	7.95
Sulfate	Report	28,300	Report	60,000
Chloride	Report	Report	Report	Report
Fluoride	Report	150	Report	400
Hexavalent Chromium	Report	1.07	Report	2.31
BOD5	Report	Report	Report	Report
Naphthalene	--	--	Report	3.7
Tetrachloroethylene	--	--	Report	5.98
Total Residual Chlorine	Report	--	Report	--

- **Effluent Flow for WLA Analysis:** Not Applicable (The highest monthly average flow from October 2006 through September 2008 was 9.05 mgd and occurred during September 2008. The February 10, 2009 permit application update lists an average flow of 11.6 mgd.)

Outfalls 001, 002, 003 and 004

- **Type of Treatment:** A permit modification was issued May 23, 1991 to allow the use of water treatment additives to control zebra mussels.
- **Current Effluent Limits:**

Pollutant	Monthly Average		Daily Maximum	
	(mg/l)	(lbs/day)	(mg/l)	(lbs/day)
Total Residual Oxidants	--	--	0.05	--
Total Residual Chlorine	0.02	--	0.04	--

Pollutants of Concern for Outfalls 002 and 003

The pollutants of concern were identified by first considering the parameters included in the existing permit for Outfalls 002 and 003 and any individual chemicals added to the cooling water. Water treatment additives that are mixtures of chemicals are reviewed separate from this wasteload allocation report. The next step was to consider data reported on Form 2C and data reported as part of additional monitoring conducted for the permit renewal. Finally, any pollutants not monitored that have the potential to be present at elevated levels due to improper operation and maintenance of the cooling system (e.g. pollutants added from corrosion and erosion) were considered. The pollutants of concern are included in the table below.

Pollutants of Concern for WLA Analysis for Outfalls 002 and 003	
Pollutant	**Reason for Inclusion on Pollutants of Concern List**
Total residual chlorine	Limited in existing permit at Outfalls 002 and 003. The facility uses chlorine.
Aluminum, antimony, arsenic, barium, boron, total chromium, chloride, cobalt, copper, free cyanide, total cyanide, fluoride, iron, lead, manganese, molybdenum, nickel, selenium, silver, sulfate, thallium, tin, titanium, zinc and ammonia-N	Data available from Form 2C and or additional monitoring.

Pollutants of Concern for WLA Analysis for Outfall 004

The pollutants of concern were identified by first considering the parameters included in the existing permit for Outfall 004 and any individual chemicals added to the cooling water. Water treatment additives that are mixtures of chemicals are reviewed separate from this wasteload allocation report. The next step was to consider the parameters included in the Federal Effluent Limitation Guidelines that apply to internal Outfall 104 and the parameters included in the existing permit for internal Outfall 104. Next, the "Development Document for Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category," April 2002, EPA-821-R-02-004, was reviewed to identify pollutants of concern for each applicable subcategory of the guidelines. Next, the "Development Document for Effluent Limitations Guidelines and Standards for the Metal Finishing Point Source Category," June 1983, EPA 440/1-83/091, was reviewed to identify pollutants of concern. Finally, data reported on Form 2C and data reported as part of additional monitoring conducted for the permit renewal were reviewed. The pollutants of concern are included in the table below.

Pollutants of Concern for WLA Analysis for Outfall 004	
Pollutant	**Reason for Inclusion on Pollutants of Concern List**
Total residual chlorine	Limited in existing permit at Outfall 004. The facility uses chlorine.
Cadmium, hexavalent chromium, total chromium, copper, total cyanide, lead, nickel, silver, zinc, naphthalene and tetrachloroethylene	Effluent Limitation Guidelines apply to internal Outfall 104.
Fluoride, iron and sulfate	Limited in existing permit at internal Outfall 104. Identified as pollutant of concern in Iron and Steel Development Document.
Chloride	Monitored in existing permit at internal Outfall 104.
Aluminum, antimony, arsenic, barium, boron, cobalt, manganese, molybdenum, selenium, tin, titanium, ammonia-N, bis(2-ethylhexyl)phthalate, ethylbenzene, phenol, toluene and 1,1,1-trichloroethane	Identified as pollutant of concern in Iron and Steel Development Document. Data available from Form 2C.
Beryllium, free cyanide, mercury and thallium	Identified as pollutant of concern in Metal Finishing Development Document. Data available from Form 2C and or additional monitoring.
Vanadium	Identified as pollutant of concern in Iron and Steel Development Document. Data not available from Form 2C or additional monitoring.
Whole effluent toxicity	Monitored (TRE triggers apply) in existing permit at Outfall 004.

Receiving Stream Information

- **Receiving Stream:** Outfalls 001, 002, 003 and 004 discharge to Portage-Burns Waterway about 0.7, 0.6, 0.4 and 0.06 miles upstream of the Indiana portion of the open waters of Lake Michigan, respectively (see Attachment 2)
- **Drainage Basin:** Lake Michigan
- **Public Water System Intakes Downstream:** None on Portage-Burns Waterway. There are several public water system intakes in Lake Michigan, but none will impact this analysis.
- **Designated Stream Use:** Portage-Burns Waterway is designated for full-body contact recreation and shall be capable of supporting a well-balanced, warm water aquatic community. Lake Michigan is designated for full-body contact recreation and shall be capable of supporting a well-balanced, warm water aquatic community. The East Branch of Little Calumet River and its tributaries downstream to Lake Michigan via Burns Ditch (Portage-Burns Waterway) are designated in 327 IAC 2-1.5-5(a)(3)(B) as salmonid waters and shall be capable of supporting a salmonid fishery. Therefore, Portage-Burns Waterway is designated as a salmonid water. The Indiana portion of the open waters of Lake Michigan is designated in 327 IAC 2-1.5-5(a)(3)(G) as a salmonid water and shall be capable of supporting a salmonid fishery. The Indiana portion of the open waters of Lake Michigan is designated in 327 IAC 2-1.5-19(b)(2) as an outstanding state resource water (OSRW). Discharges to tributaries of OSRWs are subject to the antidegradation implementation procedure for OSRWs in 327 IAC 5-2-11.7.
- **14 Digit HUC:** 04040001060040
- **Assessment Unit (2008):** INC0164_T1108
- **303(d) List (2008):** Portage-Burns Waterway (assessment unit INC0164_T1108) is on the 2008 303(d) list for PCBs in fish tissue. The Lake Michigan shoreline is on the 2008 303(d) list for mercury and PCBs in fish tissue.
- **TMDL Status:** A TMDL for *E. coli* for Portage-Burns Waterway (assessment unit INC0164_T1108) was approved by U.S. EPA January 28, 2005 and is part of the Little Calumet/Burns Ditch TMDL. The current U.S. Steel - Midwest permit includes the discharge of sanitary wastewater from Outfall 006. The TMDL notes that U.S. Steel - Midwest is planning to discharge their sanitary wastewater to the Portage WWTP. According to the U.S. Steel - Midwest May 2005 DMR, Outfall 006 was closed May 25, 2005. The TMDL requires load reductions from nonpoint sources, but not from point source discharges. With the elimination of the sanitary discharge, the TMDL does not require permit limits for *E. coli* on any of the U.S. Steel - Midwest outfalls. A TMDL for *E. coli* for the Lake Michigan shoreline was approved by U.S. EPA September 1, 2004 and is part of the Lake Michigan TMDL.
- **Q7,10 (Upstream of Facility):** 110 cfs (USGS gaging station 04095090 Burns Ditch at Portage is on Portage-Burns Waterway at the bridge downstream of Outfall 001 and upstream of Outfall 002. This station began operation 10-1-1994. Daily mean flow data approved by the USGS for this station are available from the USGS website for the period 10-1-1994 through 9-30-2007. The U.S. EPA has a program (DFLOW version 3.1) that calculates stream design flows using daily mean flow values. The program was downloaded from the U.S. EPA website and used to calculate the stream design flows using the approved daily mean flow data. The stream design flows are based on the climatic year (April 1 through

March 31). It should be noted that the Q7,10 calculated using the flow data is less than expected considering the flow contributions from the watershed (ArcelorMittal Burns Harbor, East Branch Little Calumet River and Salt Creek) upstream of the gage. The USGS was contacted about the reliability of flow data recorded at the gage. The hydrodynamics at the gage are complicated by backwater and reverse flows due to Lake Michigan. The gage consists of a water-stage recorder and an Acoustic Doppler velocity meter. The USGS is confident that the daily mean flows recorded at the gage are accurate to within plus or minus 10-15% and should not be biased low. Therefore, the data were used to calculate the stream design flows.)

- **Q1,10 (Upstream of Facility):** 88 cfs
- **Q90,10 (Upstream of Facility):** 186 cfs
- **Harmonic Mean Flow (Upstream of Facility):** 352 cfs
- **Nearby Dischargers:** There are several dischargers to tributaries of Portage-Burns Waterway upstream of this facility. The Chesterton WWTP (IN0022578), Praxair (IN0043435) and ArcelorMittal Burns Harbor (IN0000175) discharge to East Branch Little Calumet River. The Valparaiso WWTP (IN0024660) and South Haven WWTP (IN0030651) discharge to Salt Creek and a number of sanitary WWTPs discharge to tributaries of Salt Creek. The Portage WWTP (IN0024368) discharges to Burns Ditch. Only ArcelorMittal, Valparaiso and Portage currently have monitoring data available for metals. All of these dischargers contribute to the background concentrations upstream of U.S. Steel - Midwest. However, only the ArcelorMittal and Portage discharges were specifically considered in the WLA analysis because of the availability of data and the fact that they are relatively close to U.S. Steel - Midwest.

Calculation of Water Quality-based Effluent Limitations for Total Residual Chlorine

Total residual chlorine is a common pollutant of concern for Outfalls 002, 003 and 004. Noncontact cooling water is no longer discharged through Outfall 001 so it is no longer a pollutant of concern at Outfall 001. Outfalls 002 (7.08 mgd), 003 (18.7 mgd) and 004 (43.8 mgd) are located on the same side of Portage-Burns Waterway within a 0.5 mile segment. Because of the potential for overlapping mixing zones, these discharges were combined (total discharge of 69.58 mgd) in the calculation of water quality-based effluent limitations (WQBELs) for total residual chlorine. This was done in accordance with 5-2-11.4(b)(3)(D) which requires the combined effect of overlapping mixing zones to be evaluated to ensure that applicable criteria and values are met in the area where the mixing zones overlap. The background concentration of total residual chlorine was set equal to zero because instream data are not available and any contribution from upstream dischargers is not expected to result in measurable concentrations in the receiving stream.

The coefficient of variation used to calculate monthly average and daily maximum WQBELs was set equal to the default value of 0.6. The number of samples per month used to calculate monthly average WQBELs was set equal to 4 based on the expected monitoring frequency. The spreadsheet used to calculate WQBELs is included in Attachment 3.

Calculation of Preliminary Effluent Limitations for Outfall 004

The representative background concentration of a pollutant for use in developing wasteload allocations is determined in accordance with 327 IAC 5-2-11.4(a)(8). According to this provision, best professional judgment is to be used to select the one data set that most accurately reflects or estimates background concentrations when data in more than one of the following data sets exist:

(A) Acceptable available water column data.
(B) Water column concentrations estimated through use of acceptable available caged or resident fish tissue data.
(C) Water column concentrations estimated through use of acceptable available or projected pollutant loading data.

The background concentration is calculated as the geometric mean of the selected data set. In the case of U.S. Steel - Midwest, instream data are available from fixed water quality monitoring station BD 1 Burns Ditch at Portage. This station is located at the U.S. Highway 12 Bridge upstream of Outfall 001. Water quality data from fixed station BD 1 were obtained for the period January 2003 through December 2007. Instream data for all of the pollutants of concern are not available from fixed station BD 1 so data were obtained from nearby waterbodies. The Surveys Section conducted quarterly trace metals sampling in Deep River downstream of the Lake George Dam during the period from 2002 through 2006. The data from the trace metals sampling were used for several pollutants that are not monitored at the fixed station and for cadmium which was reported as nondetect at the fixed station. Water quality data were obtained from the Surveys Section database. The time periods chosen for the different data sets are based on the availability of data and the desire to have data for whole years. Data were limited to the last five years. IDEM sampling data were not available for boron, cobalt, molybdenum, tin and titanium so the background concentrations were determined using data for Lake Michigan reported by BP Products in their April 2002 permit renewal application. Based on 327 IAC 5-2-11.4(b)(1), a mixing zone is not allowed for BCCs so stream data were not required for mercury.

The background concentration of each pollutant based on instream data was determined by calculating the geometric mean of the instream data for the pollutant (327 IAC 5-2-11.4(a)(8)). In 327 IAC 5-2-11.4(a)(8) a procedure is included for calculating background concentrations when the data set includes values below the limit of detection. In this procedure, values in the data set below the limit of detection (LOD) are assigned the value (V) and then the geometric mean of the data set is calculated. The value (V) is determined as follows:

$$V = (LOD) \times [1 - (\text{Number of nondetects})/(\text{Total number of values})]$$

The fixed station data are actually reported as less than the limit of quantitation (LOQ). Therefore, a procedure based on best professional judgment was used for the fixed station data. If less than one-half the values in the data set were below the LOQ, the values below the LOQ were assigned the value (V) and then the geometric mean of the data set was calculated. The value (V) was determined as follows:

$$V = (LOQ) \times [1 - (\text{Number below LOQ})/(\text{Total number of values})]$$

If one-half or more of the values in the data set were below the LOQ, the values below the LOQ were set equal to one-half the LOQ. The determination of background concentrations based on instream data is included in Attachments 4 through 10. The daily mean flow measured at USGS gaging station 04095090 Burns Ditch at Portage the day each sample at fixed station BD 1 was collected is included in Attachments 5-7 along with the pollutant concentration data.

Pollutant loading data for some pollutants of concern are available for the Portage WWTP and pollutant loading data for most of the pollutants of concern in this WLA analysis are available for ArcelorMittal Burns Harbor. However, considering the multiple sources of flow upstream of U.S. Steel - Midwest and the distance between the dischargers, it was decided that the instream data would more accurately reflect the background concentrations. However, the effluent concentrations available for ArcelorMittal and Portage were compared to the background concentrations calculated using the instream data to determine if the background concentration of any pollutant may potentially be underestimated, and if so, whether the potentially higher background concentration would significantly impact the preliminary effluent limitations and reasonable potential analysis. After reviewing the data for ArcelorMittal and Portage, the background concentrations calculated using the instream data were considered to be acceptable to calculate preliminary effluent limitations and do the reasonable potential analyses.

The background concentration of chromium (VI) was set equal to zero after consideration of the fixed station and trace metals sampling results for chromium (VI). The background concentration of free cyanide was set equal to zero after consideration of the sampling results for total cyanide at the fixed station and the trace metals sampling results for free cyanide. For the organic chemicals that are pollutants of concern, data from fixed station BD-1 are only available for naphthalene and total phenolics. The most recent data are from 2000. The data are included in Attachment 11. The data for total phenolics are from regular monthly fixed station monitoring and the data for naphthalene are from a special project. While the data are greater than five years old, effluent data for ArcelorMittal Burns Harbor show that it discharges detectable levels of naphthalene so the data were used in the analysis. The data for total phenolics were assumed to be representative of the background concentration of phenol. The background concentrations of the other organic chemicals were set equal to zero because stream data are not available and effluent data submitted with the ArcelorMittal Burns Harbor permit application show effluent concentrations <2 ug/l.

Outfalls 002 and 003 contribute noncontact cooling water and stormwater to Portage-Burns Waterway upstream of Outfall 004. A review of effluent data for these outfalls revealed that effluent concentrations are similar to or less than background concentrations (see Reasonable Potential Analysis for Outfall 002 and Outfall 003, below). Therefore, except for the calculation of WQBELs for total residual chlorine, it was decided to consider these flows in the determination of stream design flows for the calculation of preliminary effluent limitations (PELs) for Outfall 004. The combined monthly average flows for Outfalls 002 and 003 are included in Attachment 12 for the last two years (October 2006 through September 2008). The last two years of approved daily mean flow data for the USGS gage are also included. The lowest combined flow occurred in November 2007. The effluent flows at Outfalls 002 and 003 are reported on a weekly basis. The flows reported each week in November and December were averaged with the flow from the prior week to calculate combined weekly average flows. The calculations are included in Attachment 12. The lowest weekly average flow was 30 cfs. A value of 30 cfs was added to the Q7,10, Q90,10 and harmonic mean flows. Since effluent flows are not reported on a daily basis, the combined Outfall 002 and 003 flow was not added to the Q1,10 value. The stream design flows for Outfall 004 are included below:

- **Q7,10 (Outfall 004):** 140 cfs
- **Q1,10 (Outfall 004):** 88 cfs
- **Q90,10 (Outfall 004):** 216 cfs
- **Harmonic Mean Flow (Outfall 004):** 382 cfs

According to 5-2-11.4(a)(13), the 50th percentile downstream hardness is to be used to determine the criteria for those metals whose criteria are dependent on hardness. There is no downstream fixed station so hardness data were obtained from fixed station BD 1. The 50th percentile hardness calculated using the last five years of data is 271 mg/l. The data are included in Attachment 13. According to 5-2-11.4(a)(13), the 75th percentile downstream temperature and pH are to be used to determine the ammonia-N criteria. Temperature and pH data were also obtained from fixed station BD 1. Using the last five years of data, the summer/winter 75th percentile pH values are 8.0/8.0 s.u. and the summer/winter 75th percentile temperatures are 24/8.2 °C. The data are included in Attachments 14 and 15.

In addition to the aquatic life, human health and wildlife criteria that apply to all waters within the Great Lakes system, there are criteria in 327 IAC 2-1.5-8(j) that apply specifically to Lake Michigan. For the pollutants of concern, Lake Michigan criteria apply to chloride, fluoride and sulfate. The criteria for chloride are the same as the aquatic life criteria that apply to Portage-Burns Waterway. The criteria for fluoride and sulfate are more stringent. In accordance with 327 IAC 5-2-11.4(a)(3), TMDLs, WLAs calculated in the absence of a TMDL, and preliminary WLAs must ensure attainment of applicable water quality standards including all numeric and narrative water quality criteria set forth in 327 IAC 2-1.5-8 and 327 IAC 2-1.5-16, and Tier I criteria and Tier II values established under 327 IAC 2-1.5-11 through 327 IAC 2-1.5-16. Therefore, to ensure that the concentrations of fluoride and sulfate in Portage-Burns Waterway meet the Lake Michigan criteria for these pollutants at the confluence of Portage-Burns Waterway with Lake Michigan, PELs were calculated using the Lake Michigan criteria and 100% dilution of effluent and receiving stream flow. These PELs were compared to the PELs based on the discharge meeting aquatic life, human health and wildlife criteria in Portage-Burns Waterway and the more stringent PELs were used as the applicable PELs.

The coefficient of variation used to calculate monthly average and daily maximum PELs was set equal to the default value of 0.6. The number of samples per month used to calculate monthly average PELs was based on the expected monitoring frequency. For mercury the number of samples per month was set equal to 1. For cadmium, copper, silver and free cyanide the number of samples per month was set equal to 2 and for the other pollutants the number of samples per month was set equal to 4. Aquatic life criteria or ambient screening values are currently not available for aluminum or iron so PELs could not be calculated for these pollutants of concern.

The spreadsheet used to calculate PELs is included in Attachment 16. Human health cancer criteria or values are available for bis(2-ethylhexyl) phthalate and tetrachloroethylene. However, effluent data submitted with the permit application show a concentration of <10 ug/l for bis(2-ethylhexyl) phthalate. Based on a conversation with staff at the Indiana State Department of Health laboratory, concentrations of bis(2-ethylhexyl) phthalate in the range of 10 to 20 ug/l could be the result of lab contamination. Considering the data submitted with the permit application, bis(2-ethylhexyl) phthalate will not be considered present in the discharge. Since the discharge only contains one substance with human health cancer criteria, the additivity provision under 327 IAC 5-2-11.4(a)(4)(A) will not have to be used to adjust any human health cancer wasteload allocations. Aquatic life screening values for sulfate in Attachment 16 are based on the sulfate criteria in 327 IAC 2-1-6(a)(5) using Lake Michigan hardness (140 mg/l) and chloride (15 mg/l) concentrations. The applicable PELs for fluoride and sulfate are based on Lake Michigan criteria. The PELs for tin and titanium were calculated using ambient screening values instead of actual water quality criteria. Therefore, they cannot be used as effluent limitations in an NPDES permit, but they can be used to screen the discharge for potential water quality impacts.

Reasonable Potential Analysis for Outfall 002 and Outfall 003

U.S. Steel - Midwest does not monitor Outfall 002 or Outfall 003 for toxic pollutants other than total residual chlorine. However, they did provide dry weather sampling data for Outfall 002 and Outfall 003 as part of their April 1999 revised permit renewal application. For the parameters not currently monitored or limited at Outfall 002 and Outfall 003, the data reported with the April 1999 revised permit renewal application are the same as the data reported with the September 1994 permit renewal application. The data are included in Attachment 17. They also conducted additional monitoring for the permit renewal in September 2001 and in April and May 2010. The data are included in Attachments 18-A and 18-B. Since these outfalls only consist of once-through noncontact cooling water and stormwater, a reasonable potential to exceed analysis was conducted under 327 IAC 5-2-11.5(g). The implementation of this provision must be in accordance with the following: "Revised Addendum to the National Pollutant Discharge Elimination System Memorandum of Agreement Between the State of Indiana and the United States Environmental Protection Agency Region 5 Concerning Indiana's Great Lakes Water Quality Standards and Implementation Procedures Rulemaking" signed in March 2006.

The provision in 5-2-11.5(g) may be used if the intake and outfall points for the noncontact cooling water are located on the same body of water and the discharge consists solely of once-through noncontact cooling water. Under 5-2-11.5(g)(6), if a wastestream consisting solely of noncontact cooling water combines with a wastestream consisting of stormwater, this provision may still be applied to the wastestream consisting solely of noncontact cooling water if, for the wastestream composed entirely of stormwater, permit conditions that the commissioner determines to be necessary to protect the water quality of the receiving waterbody are imposed. The requirements imposed shall be as if the stormwater wastestream discharged directly into the receiving waterbody and shall be consistent with requirements imposed on other similar stormwater discharges to the waterbody. It is assumed that the stormwater discharges to Outfalls 002 and 003 will be regulated as if they discharged directly to Portage-Burns Waterway and will receive requirements consistent with other stormwater discharges.

In accordance with 327 IAC 5-2-11.5(b)(4)(B)(iv), an intake pollutant shall be considered to be from the same body of water as the discharge if the intake point is located on Lake Michigan and the outfall point is located on a tributary of Lake Michigan and the following conditions are met:

(A) The representative background concentration of the pollutant in the receiving water, as determined under 327 IAC 5-2-11.4(a)(8) (excluding any amount of the pollutant in the facility's discharge) is similar to or greater than that in the intake water.
(B) Any difference in a water quality characteristic (such as temperature, pH, and hardness) between the intake and receiving waters does not result in an adverse impact on the receiving water.

The facility reported intake data in addition to effluent data with their permit renewal application and the data are included in Attachments 17, 18-A and 18-B. Lake Michigan data are also available from IDEM fixed water quality monitoring stations. The representative background concentration in Portage-Burns Waterway upstream of the facility was determined above (see Calculation of Preliminary Effluent Limitations for Outfall 004). A review of the background and intake concentrations for each pollutant of concern shows that the background concentration is similar to or greater than the intake concentration. The data for free cyanide for Outfalls 002 and 003 were greater than the data for total cyanide. Since free cyanide is a subset of total cyanide, the free cyanide samples are not considered valid. While the hardness of the intake water (140 mg/l at fixed station LM OD Lake Michigan at Ogden Dunes; see Attachment 13) is less than that in Portage-Burns Waterway (271 mg/l; see Attachment 13), it is not expected to result in an adverse impact on the receiving stream. Therefore, Portage-Burns Waterway and Lake Michigan may be considered the same body of water for purposes of implementing the reasonable potential provision in 5-2-11.5(g).

A comparison of the intake data to the Outfall 002 and 003 data in Attachments 17, 18-A and 18-B shows that the concentrations of the pollutants of concern in Outfalls 002 and 003 are similar to the concentrations in the intake water. Therefore, the use of the intake water as noncontact cooling water is not resulting in elevated levels of the pollutants of concern in the discharges through Outfalls 002 and 003. Therefore, based on the provision in 5-2-11.5(g), the pollutants of concern for which Outfall 002 and 003 data are available in Attachments 17, 18-A and 18-B do not show reasonable potential to exceed.

Reasonable Potential Analysis for Outfall 004

Calculation of Projected Effluent Quality

U.S. Steel - Midwest does not monitor Outfall 004 for toxic pollutants other than total residual chlorine. However, they did provide data for Outfall 004 as part of their April 1999 revised permit renewal application. For the parameters not currently monitored or limited at Outfall 004, the data reported with the April 1999 revised permit renewal application are the same as the data reported with the September 1994 permit renewal application. The data are included in Attachment 17. They conducted additional monitoring for the permit renewal in September 2001. The data are included in Attachment 18-A. At the request of IDEM, they conducted additional monitoring in 2008 and submitted data for all pollutants requested except vanadium. The facility continued to monitor for mercury in 2009 and 2010. The data for internal Outfall 104 are included in Attachment 19 and the data for Outfall 004 are included in Attachments 20-A and 20-B. Outfall 004 consists of treated wastewater from internal Outfall 104, noncontact cooling water and stormwater. The facility currently monitors internal Outfall 104 for hexavalent chromium, total chromium, total cyanide, lead, zinc, chloride, fluoride, sulfate, naphthalene and tetrachloroethylene. Considering the other sources of flow to Outfall 004, the concentrations of these pollutants at internal Outfall 104 are expected to be higher than at Outfall 004. Therefore, in addition to the data included as part of the permit renewal application, data collected at internal Outfall 104 for the period October 2005 through September 2008 were used in a separate, conservative test of reasonable potential at Outfall 004.

Data collected for total cyanide at internal Outfall 104 were also used to calculate PEQs for free cyanide. These were compared to the PELs for free cyanide as a conservative test of reasonable potential for free cyanide. The data for internal Outfall 104 were obtained from the monthly monitoring report (MMR) for each month. The data for total chromium, total cyanide and zinc are not included in this report due to the large number of samples. The data for the other pollutants are included in Attachments 21 through 23. The sulfate data in Attachment 22 are net values. The maximum monthly average and maximum daily value both occurred in December 2005. The facility monitors sulfate in the intake water and reports internal Outfall 104 sulfate values as net values after subtracting the intake concentration. The monthly average intake concentration was 24 mg/l and the daily maximum intake concentration was 26 mg/l in December 2005. These values were added to the maximum monthly average and maximum daily values in Attachment 22 to obtain maximum monthly average and maximum daily values for use in calculating PEQs.

The effluent data used in the reasonable potential analysis include values reported as less than (<) the LOD. There is no procedure in the rules for handling effluent data reported as less than the LOD. As a conservative first test of reasonable potential, they are typically set equal to the LOD. Therefore, values reported as less than (<) the LOD were assigned the reported less than value. Monthly averages were calculated for those months for which at least two data points were available. For those pollutants of concern monitored in 2008 at the request of IDEM, the data from 1994 and 2001 were only used in addition to the 2008 data to calculate PEQs if at least one of the 1994 or 2001 values was reported as greater than the LOD.

Comparison of PEQs to PELs

The reasonable potential analysis using the Outfall 004 data reported as part of the permit renewal application is included in Attachment 24. The results show that a PEQ exceeds a PEL for silver, free cyanide, chloride, fluoride and sulfate. The reasonable potential analysis using the internal Outfall 104 data is included in Attachment 25. The results show that a PEQ exceeds a PEL for lead and free cyanide. Further analysis for each of these pollutants of concern is included below:

Lead: For Outfall 004, one sample (<20 ug/l) was reported with the permit renewal application and four samples (maximum of 0.26 ug/l) were reported as part of the 2008 additional sampling. In the reasonable potential analysis using Outfall 004 data, the monthly average PEQ was less than the monthly average PEL and the daily maximum PEQ was less than the daily maximum PEL. For internal Outfall 104, all the samples obtained from MMRs were less than the LOD of 30 ug/l. This value is greater than the monthly average PEL of 28 ug/l. Therefore, in the reasonable potential analysis using internal Outfall 104 data, the monthly average PEQ exceeded the monthly average PEL based on a high LOD. Since the monthly average PEQ is based on non-quantifiable values greater than the monthly average PEL, the reasonable potential analysis using limited Outfall 004 data is based on more representative data and it can be concluded that there is no reasonable potential to exceed for lead at Outfall 004. The reasonable potential analysis using internal Outfall 104 data simply shows that the daily values are consistently less than 30 ug/l which is close to the monthly average PEL for lead of 28 ug/l.

Silver: For Outfall 004, three samples (maximum of <0.05 ug/l) less than the PEL were reported as part of the 2008 additional sampling. The monthly average PEQ is 0.31 ug/l and the monthly average PEL is 0.075 ug/l. The daily maximum PEQ is 0.15 ug/l and the daily maximum PEL is 0.13 ng/l. Therefore, reasonable potential is based on the reasonable potential multiplying factor used to calculate the monthly average and daily maximum PEQs.

Free Cyanide: For Outfall 004, one sample (<2 ug/l) was reported as part of the 2001 additional sampling and four samples (maximum of 3.3 ug/l) were reported as part of the 2008 additional sampling. In the reasonable potential analysis using Outfall 004 data, the monthly average PEQ is 15 ug/l and the monthly average PEL is 6.4 ug/l. The daily maximum PEQ is 8.6 ug/l and the daily maximum PEL is 13 ug/l. The monthly average PEQ exceeded the monthly average PEL based on the reasonable potential multiplying factor used to calculate the monthly average PEQ. The maximum value is also less than the limit of quantitation (LOQ). For the reasonable potential analysis using internal Outfall 104 data, the monthly average PEQ exceeded the monthly average PEL and the daily maximum PEQ exceeded the daily maximum PEL. Since the PEQs for free cyanide for internal Outfall 104 are based on data for total cyanide, no conclusion can be made concerning reasonable potential for free cyanide using internal Outfall 104 data. However, there is reasonable potential to exceed for free cyanide based on the analysis using Outfall 004 data.

Chloride: For Outfall 004, one sample (55 mg/l) was reported as part of the 2001 additional sampling and four samples (maximum of 89 mg/l) were reported as part of the 2008 additional sampling. In the reasonable potential analysis using Outfall 004 data, the monthly average PEQ is 508 mg/l and the monthly average PEL is 257 mg/l. The daily maximum PEQ is 205 mg/l and the daily maximum PEL is 516 mg/l. The monthly average PEQ exceeded the monthly average PEL based on the reasonable potential multiplying factor used to calculate the monthly average PEQ. In the reasonable potential analysis using internal Outfall 104 data, a PEQ did not exceed a PEL. A comparison of the data for chloride at internal Outfall 104 (Attachment 19) to that at Outfall 004 (Attachment 20-A) shows that the cooling water added to Outfall 004 dilutes the higher pollutant concentrations at internal Outfall 104. This shows that the reasonable potential analysis using internal Outfall 104 data is a conservative analysis and can be considered to be based on more representative data due to the limited data available for Outfall 004. Therefore, it can be concluded that there is no reasonable potential to exceed for chloride at Outfall 004.

Fluoride: For Outfall 004, one sample (930 ug/l) was reported with the permit renewal application and one sample (320 ug/l) was reported as part of the 2001 additional sampling. Four samples (maximum of 500 ug/l) were reported as part of the 2008 additional sampling. In the reasonable potential analysis using Outfall 004 data, the monthly average PEQ is 2500 ug/l and the monthly average PEL is 1700 ug/l. The daily maximum PEQ is 2000 ug/l and the daily maximum PEL is 3500 ug/l. The monthly average PEQ exceeded the monthly average PEL based on the reasonable potential multiplying factor used to calculate the monthly average PEQ. In the reasonable potential analysis using internal Outfall 104 data, a PEQ did not exceed a PEL. A comparison of the data for fluoride at internal Outfall 104 (Attachment 19) to that at Outfall 004 (Attachment 20-A) shows that the cooling water added to Outfall 004 dilutes the higher pollutant concentrations at internal Outfall 104. This shows that the reasonable potential analysis using internal Outfall 104 data is a conservative analysis and can be considered to be based on more representative data due to the limited data available for Outfall 004. It should be noted that the 2008 Outfall 004 and internal Outfall 104 data for fluoride were obtained using an analytical method with an LOQ of 500 ug/l and the MMR data for internal Outfall 104 were obtained using an analytical method with an LOQ of 250 ug/l. Therefore, it can be concluded that there is no reasonable potential to exceed for fluoride at Outfall 004.

Sulfate: For Outfall 004, one sample (89 mg/l) was reported with the permit renewal application and four samples (maximum of 150 mg/l) were reported as part of the 2008 additional sampling. In the reasonable potential analysis using Outfall 004 data, the monthly average PEQ is 887 mg/l and the monthly average PEL is 514 mg/l. The daily maximum PEQ is 345 mg/l and the daily maximum PEL is 1032 mg/l. The monthly average PEQ exceeded the monthly average PEL based on the reasonable potential multiplying factor used to calculate the monthly average PEQ. A comparison of the data for sulfate at internal Outfall 104 (Attachment 19) to that at Outfall 004 (Attachment 20-A) shows that the cooling water added to Outfall 004 dilutes the higher pollutant concentrations at internal Outfall 104. This shows that the reasonable potential analysis using internal Outfall 104 data is a conservative analysis and can be considered to be based on more representative data due to the limited data available for Outfall 004. Therefore, it can be concluded that there is no reasonable potential to exceed for sulfate at Outfall 004.

Conclusion

Even though reasonable potential for silver and free cyanide are based on limited data sets, WQBELs are still required. However, it is recommended that the facility be allowed to request a review of reasonable potential after more data are collected. The data should be collected at a minimum frequency of two times per month and for a minimum duration of ten months. This will allow monthly averages and a coefficient of variation to be calculated. It should be noted that WQBELs for silver will be required, regardless of the reasonable potential statistical procedure, if the mass-based WQBELs at Outfall 004 are more stringent than the technology-based limits for silver that apply to internal Outfall 104.

Reasonable Potential Analysis for Total Residual Chlorine

In addition to establishing WQBELs based on the reasonable potential statistical procedure, IDEM is also required to establish WQBELs under 5-2-11.5(a) "If the commissioner determines that a pollutant or pollutant parameter (either conventional, nonconventional, a toxic substance, or whole effluent toxicity (WET)) is or may be discharged into the Great Lakes system at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any applicable narrative criterion or numeric water quality criterion or value under 327 IAC 2-1.5." Chlorine is added to the intake water for zebra mussel control at concentrations exceeding water quality criteria. Therefore, chlorine may be discharged at a level that will cause an excursion above the numeric water quality criterion for total residual chlorine under 2-1.5 and WQBELs for total residual chlorine are required at outfalls receiving noncontact cooling water. Outfalls 002, 003 and 004 receive noncontact cooling water so WQBELs for total residual chlorine are required at these outfalls.

Reasonable Potential Analysis for WET for Outfall 004

U.S. EPA disapproved the reasonable potential procedure for whole effluent toxicity at 327 IAC 5-2-11.5(c)(1). In place of 5-2-11.5(c)(1), IDEM is required to apply Paragraphs C.1 and D of Procedure 6 in Appendix F of 40 CFR Part 132. The following analysis is based on Paragraphs C.1 and D of Procedure 6 in Appendix F of 40 CFR Part 132.

Effluent Data

U.S. Steel - Midwest is required to monitor for acute and chronic WET using *Ceriodaphnia dubia* and Fathead Minnow two times per year. The samples have typically been collected in May and November. Effluent data for WET for the period May 2003 through November 2008 are included in Attachment 26. Chronic toxicity was calculated using the NOEC values because the IC_{25} values were not reported.

Reasonable Potential Analysis for Acute WET
The WET of an effluent is or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above the numeric interpretation of the narrative criterion for acute WET at 2-1.5-8(b)(1)(E)(ii) when effluent specific WET data demonstrates that:

(TUa effluent) x (B) x (effluent flow)/(Qad + effluent flow) > AC

where,

TUa effluent = maximum acute WET result
B = multiplying factor from 5-2-11.5(h)
effluent flow = effluent flow used to calculate WQBELs for individual pollutants
Qad = amount of receiving water available for dilution
AC = numeric interpretation of the narrative criterion for acute WET

For U.S. Steel - Midwest, the following apply:

TUa effluent = <1.0 TUa (*Ceriodaphnia dubia* and Fathead Minnow)
B = 1.0 (based on 12 samples and a CV of 0.0)
effluent flow = 43.8 mgd
Qad = 0.0 mgd (an alternate mixing zone has not been approved for acute WET)
AC = 1.0 TUa (the applicable numeric interpretation of the narrative criterion for acute WET for the case where an alternate mixing zone for acute WET has not been approved)

(<1.0 TUa) x (1.0) x (43.8 mgd)/(0.0 mgd + 43.8 mgd) = <1.0 TUa

It cannot be demonstrated that the calculated value is greater than 1.0 TUa, so there is no reasonable potential for acute WET.

Reasonable Potential Analysis for Chronic WET
The WET of an effluent is or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above the numeric interpretation of the narrative criterion for chronic WET at 2-1.5-8(b)(2)(A)(iv) when effluent specific WET data demonstrates that:

(TUc effluent) x (B) x (effluent flow)/(Qad + effluent flow) > CC

where,

TUc effluent = maximum chronic WET result
B = multiplying factor from 5-2-11.5(h)
effluent flow = effluent flow used to calculate WQBELs for individual pollutants

Qad = amount of receiving water available for dilution
CC = numeric interpretation of the narrative criterion for chronic WET

For U.S. Steel - Midwest, the following apply:

TUc effluent = 5.8 TUc (Fathead Minnow)
B = 2.0 (based on 12 samples and a CV of 0.9)
effluent flow = 43.8 mgd
Qad = 22.5 mgd (25% of the Q7,10 (90 mgd))
CC = 1.0 TUc

(5.8 TUc) x (2.0) x (43.8 mgd)/(22.5 mgd + 43.8 mgd) = 7.7 TUc

Since the calculated value is greater than 1.0 TUc, there is reasonable potential for chronic WET.

Antidegradation Analysis for High Quality Waters for Non-BCCs

New mass limits for total residual chlorine are required at Outfalls 002, 003 and 004. Since the discharges from all three outfalls were combined in the calculation of PELs, the discharges were also combined in the antidegradation analysis. New mass and concentration limits for silver and free cyanide are also required at Outfall 004. Significant lowering determinations for total residual chlorine, silver and free cyanide were made under 327 IAC 5-2-11.3(b)(1)(B).

High Quality Water Determination

High Quality Water Determination		
Pollutant	**High Quality Water? (Yes/No)**	**Rationale for Determination**
Total residual chlorine, silver and free cyanide	Yes	There are no data available to determine the quality of Portage-Burns Waterway for total residual chlorine, silver or free cyanide. Therefore, Portage-Burns Waterway will be considered a high quality water for total residual chlorine, silver and free cyanide.

Significant Lowering Determination for Total Residual Chlorine

Existing Effluent Flow: 69.58 mgd (Combined Outfalls 002, 003 and 004)

- **Results:** The results of the significant lowering determination are included in Attachment 27 and they show that the WQBELs for total residual chlorine do not cause a significant lowering of water quality for total residual chlorine under 327 IAC 5-2-11.3(b)(1)(B). Therefore, an antidegradation demonstration is not required for total residual chlorine.

Significant Lowering Determination for Silver and Free Cyanide

Existing Effluent Flow: 43.8 mgd (Outfall 004)

Results: The results of the significant lowering determination are included in Attachment 28. Effluent limits are not included in the current permit for silver or free cyanide so the existing effluent quality for these pollutants was used in the significant lowering determination. The existing effluent quality was set equal to the monthly average PEQ. The results show that the WQBELs for silver and free cyanide do not cause a significant lowering of water quality for silver or free cyanide under 327 IAC 5-2-11.3(b)(1)(B). Therefore, an antidegradation demonstration is not required for silver or free cyanide.

Antidegradation Analysis for OSRWs

According to 327 IAC 5-2-11.7(a)(2), for a new or increased discharge of a pollutant or pollutant parameter from a new or existing Great Lakes discharger into a tributary of an OSRW for which a new or increased permit limit would be required, the following apply:

(1) 5-2-11.3(a) and 5-2-11.3(b) apply to the new or increased discharge; and
(2) the discharge shall not cause a significant lowering of water quality in the OSRW.

According to nonrule policy document Water-002-NPD, "Antidegradation Requirements for Outstanding State Resource Waters Inside the Great Lakes Basin," a new or increased discharge into a tributary of Lake Michigan will not cause a significant lowering of water quality in Lake Michigan if any of the following are met:

(1) The new or increased discharge into a tributary of Lake Michigan is the result of an activity that will result in a significant overall environmental benefit to Lake Michigan.
(2) The new or increased discharge into a tributary of Lake Michigan does not cause a significant lowering of water quality in the tributary, as determined under 327 IAC 5-2-11.3(b)(1)(A) or 327 IAC 5-2-11.3(b)(1)(B).
(3) For non-bioaccumulative chemicals of concern, the new or increased discharge into a tributary of Lake Michigan uses less than 10% of the unused loading capacity of Lake Michigan. For the purposes of this provision:
    (A) "Unused loading capacity" means that amount of the total loading capacity not utilized by point source and nonpoint source discharges.
    (B) "Total loading capacity" means the product of the applicable water quality criterion times the sum of the following:
        (i) The flow in the tributary at the point it enters into Lake Michigan; and
        (ii) An equal volume of Lake Michigan water.
    (C) The unused loading capacity and total loading capacity will be established at the time that the request to lower the water quality is proposed. The stream flows used in the calculations will be the applicable stream design flows for the particular criteria.

New mass limits for total residual chlorine were calculated for Outfalls 002, 003 and 004. New mass and concentration limits for silver and free cyanide were also calculated for Outfall 004. The new limits for total residual chlorine, silver and free cyanide do not cause a significant lowering of water quality for total residual chlorine, silver or free cyanide in Portage-Burns Waterway under 5-2-11.3(b)(1)(B). Therefore, condition (2) is met and the new limits for total residual chlorine, silver and free cyanide do not cause a significant lowering of water quality in Lake Michigan.

Thermal Requirements

The current permit issued in 1990 includes thermal effluent requirements for the combined effect of Outfalls 002, 003 and 004. The requirements are based on temperature criteria that applied prior to the 1990 change in water quality standards. Prior to 1990, Portage-Burns Waterway was considered a migration route for salmonids and the following temperature criteria, in addition to those that apply to a warm water aquatic community, applied outside of the mixing zone.

(1) The maximum temperature rise at any time or place above natural shall not exceed 2 °F.
(2) The temperature shall not exceed 70 °F at any time or place during periods of migration nor exceed 85 °F at any time.

These criteria were incorporated in the thermal requirements along with the temperature criteria for a warm water aquatic community when they are more stringent than those for salmonids. Due to the presence of ArcelorMittal Burns Harbor (formerly Bethlehem Steel), which has a 316(a) thermal variance, upstream of the facility, only the 2 °F maximum temperature rise requirement had to be met when the upstream temperature equaled or exceeded the maximum limitation for the day. The actual periods of salmonid migration were not specifically listed in the permit.

The facility was originally required to select a downstream temperature sampling site at the edge of the mixing zone to measure compliance with the thermal requirements. The requirements for determining mixing zones in the regulations prior to 1990 were to be considered in determining the location. Those requirements are the same as the current ones in 327 IAC 2-1-4 for the non-Great Lakes system which state that the mixing zone should be limited to no more than 25% of the cross-sectional area and/or volume of flow of the stream, leaving at least 75% free as a zone of passage for aquatic biota nor should it extend over one-half of the width of the stream. Due to nautical traffic in Portage-Burns Waterway, the facility was allowed to develop a mathematical model for determining mixed river temperature. The model was to consider upstream flow and temperature and effluent flow and temperature.

In January 1991 the facility submitted to IDEM the mathematical model they planned to use to show compliance with their thermal requirements. The model was developed by ERM-North Central, Inc., St. Charles, Missouri. The model was one that simulates buoyant surface jets and was developed prior to the completion of CORMIX 3 which IDEM would currently use to evaluate buoyant surface discharges. In developing the model, the consultant relied on the work of the principle developer of CORMIX 3. That work is included in the paper "Buoyant Surface Jets" by Gerhard H. Jirka, E. Eric Adams and Keith D. Stolzenbach published in "ASCE Journal of the Hydraulics Division," November 1981. The underlying model is a jet integral model for a buoyant surface jet discharging into a stagnant receiving water of large horizontal and vertical extent. According to the paper, the jet integral model is a good predictor of the details of the mixing process provided certain phenomena are accounted for and these phenomena relate mainly to the following three factors: the jet like behavior ceases after a transition distance; shallow receiving water causes bottom attachment; and, strong crosscurrents cause shoreline attachment downstream of the discharge.

Considering that the discharge is to a flowing channel of limited vertical extent, it was necessary to account for these three factors. The model developed by ERM included equations to calculate the following: the transition distance which is the distance from the discharge point where the jet-like near field region transitions into the density-driven far field region; the maximum jet depth which is the maximum depth at which excess jet buoyancy or temperature becomes negligible; the shallow water reduction factor which accounts for the effect of shallow water in limiting the vertical entrainment contribution; and, the stable centerline dilution factor which occurs at the end of the transition distance.

ERM defined the edge of the mixing zone as the lateral edge of the surface jet where excess velocity approaches zero. ERM stated that this point is roughly defined as the distance from the jet centerline to a point where the temperature rise is half of the centerline value. The temperature rise at the edge of the mixing zone was then estimated as half of the stable centerline temperature rise calculated by a heat balance utilizing the stable centerline dilution factor, effluent temperature and receiving stream temperature.

To account for shoreline attachment, ERM included an equation to check for shoreline attachment from the "Buoyant Surface Jets" paper. Shoreline attachment causes recirculation within the jet which reduces dilution. To account for the reduced dilution, ERM used the equation for predicting the maximum temperature rise downstream of the outfall for a shoreline attached buoyant surface jet in the paper "Design Criteria for Cooling-Water Outlet Structures" by Michael Schatzmann and Eduard Naudascher published in "ASCE Journal of the Hydraulics Division," March 1980. Whereas the temperature rise is determined at the end of the transition distance for the non-shoreline attached jet, ERM determined the maximum temperature rise at the outfall for the shoreline attached jet. ERM ran several simulations at varying river and effluent conditions and determined the ratio of the temperature rise at the edge of the mixing zone for the non-attached jet to the temperature rise at the outfall for the shoreline attached jet. The average ratio was used as a standard correction factor. If the shoreline attachment equation shows that the discharge is shoreline attached, the temperature rise at the edge of the mixing zone calculated for a non-attached jet is multiplied by the correction factor to obtain the temperature rise at the edge of the mixing zone for the shoreline attached jet.

The calculations in the ERM report are incorporated in an Excel spreadsheet that is used to determine compliance with the thermal requirements in the permit. Outfalls 002, 003 and 004 are each modeled separately using the temperature upstream of Outfall 002 as the upstream temperature for each outfall. The model output is the temperature at the edge of the mixing zone and the temperature rise at the edge of the mixing zone for each outfall. In May 1998 the facility submitted a request to modify the spreadsheet used to do the calculations. The facility had contracted the Advent Group to compare the spreadsheet equations to the methodology in the ERM report to verify accuracy and completeness. The Advent Group suggested some modifications to the spreadsheet to better conform to the methodology in the report.

After reviewing the documentation for the model and the spreadsheet used to do the calculations, the following concerns are noted:

(1) The transition distance is not bounded so the model can predict the stable centerline dilution to a distance well beyond the width of the waterway. The mixing zone rules that were applied when the permit was issued limited mixing zones to one-half the width of the stream. The Great Lakes rules that are now in effect do not specify the mixing zone for thermal discharges, but IDEM currently limits the mixing zone for thermal discharges to one-half the width of the stream to allow for a zone of passage.

(2) Instead of using the centerline dilution to calculate the temperature rise, the temperature rise was determined at the distance from the jet centerline where the temperature rise is half of the centerline value. Elevated temperature forms a barrier in the stream to fish, so having a transition distance that exceeds the width of the stream in conjunction with elevated temperatures that extend beyond the centerline can form a sizable barrier.

(3) The thermal limitations in the current permit were designed to limit the cumulative impact of the thermal discharges from Outfalls 002, 003 and 004. The model considers each outfall separately. While the outfalls are some distance apart, the temperature upstream of Outfall 004 would still be expected to be influenced by Outfalls 002 and 003.

(4) The model considered a stream velocity of 0.5 ft/sec and depth of 8 feet. At a channel width of 200 feet, the resulting stream flow is 800 cfs (noted below as "flow in ERM report") which is much larger than the Q7,10 (110 cfs) and harmonic mean (352 cfs) flows.

(5) The shoreline attached correction factor is not well documented, but results in a substantial reduction in the dilution. For outfalls 002 and 003, the correction factor is not applied for discharge flows around 9 mgd or greater. For Outfall 004 the correction factor is not applied for discharge flows around 80 mgd or greater. Based on the current discharge flows, the correction factor is only applied to Outfalls 002 and 004.

To illustrate these concerns, the model was run using the data from the September 2008 MMR. A comparison of the available dilution factor (the sum of the potential upstream flow allowed for mixing and the effluent flow divided by the effluent flow) at three stream flows (Q7,10, harmonic mean and flow in ERM report) to the modeled dilution factor is included for Outfalls 002, 003 and 004 in Attachments 29 through 31. The modeled transition distance is also included in these attachments. The difference between the available and modeled dilution factors is greatest for Outfall 003 for which the shoreline correction factor is not applied at the current discharge flow. A comparison of temperature rise (Delta T) at the edge of the mixing zone (set equal to 50% of the stream flow) to the modeled Delta T for Outfalls 002, 003 and 004 is included in Attachments 32 through 34. The comparison in Attachment 34 shows that the discharge from Outfall 004 has the greatest potential to cause instream exceedances of the 2 °F Delta T portion of the temperature criteria for cold water fish. Whereas the model gave a 2.4 °F Delta T, the Delta T calculated using a 50% mixing zone was 7.4 °F at the Q7,10 flow and 3.1 °F at the harmonic mean flow. It should be noted that the modeled transition distance and dilution factor are highly dependent on the temperature difference between the upstream temperature and the effluent temperature. The transition distance and dilution factor both increase with decreasing temperature difference. Temperature differences throughout the year can be higher or lower than shown in the example. At lower temperature differences, the modeled transition distance and dilution factor are even larger than shown in the attachments.

In the 1990 water quality standards, Portage-Burns Waterway was no longer specifically listed as a migration route for salmonids, but it was designated as a salmonid water and subject to specific water quality criteria for cold water fish. In the 1997 Great Lakes rulemaking, Portage-Burns Waterway was designated in 327 IAC 2-1.5-5(a)(3)(B) as a salmonid water and was subject to the water quality criteria for cold water fish in 2-1.5-8(d). In addition to the temperature criteria for a warm water aquatic community in 2-1.5-8(c)(4), the following temperature criteria for cold water fish in 2-1.5-8(d) now apply to the discharge outside of the mixing zone:

(1) The maximum temperature rise above natural shall not exceed 2 °F at any time or place.
(2) Unless due to natural causes, the temperature shall not exceed the following:
    (A) 70 °F at any time.
    (B) 65 °F during spawning or imprinting periods.

In 2001 a biologist at the DNR Lake Michigan Fisheries Office at Michigan City in LaPorte County was consulted about the time periods for spawning and imprinting in designated salmonid waters. IDEM received a letter from DNR dated March 7, 2001 and, based on that letter, IDEM has defined the spawning and imprinting period as September through May. Therefore, the 70 °F criterion is applied from June 1 through August 31 and the 65 °F criterion is applied from September 1 through May 31. The letter indicated that spawning and imprinting can occur at any place in the watershed so the criteria are applied throughout the watershed. The DNR confirmed IDEM's definition of the spawning and imprinting period in a February 23, 2009 email from Brian Breidert of DNR to John Elliott of IDEM.

IDEM fixed water quality monitoring station BD 1 Burns Ditch at Portage is located at the U.S. Highway 12 Bridge upstream of Outfall 002. A comparison of monthly temperature data collected at the station to the warm water and cold water temperature criteria is included in Attachment 35. The comparison shows that the upstream temperature has not exceeded the warm water criterion in any month in any year and has not exceeded the cold water criterion during the months of November through March in any year. For the months of April through

October, the upstream temperature has exceeded the cold water criterion for the month at least once. When the upstream temperature exceeds the criterion due to natural causes, only the criterion that limits the temperature rise above natural to 2 °F applies.

Based on the change in the temperature criteria applicable to the discharge, the temperature limits in the current permit should be revised. The maximum temperature during the months of June, July and August should be set at 70 °F and the maximum temperature during the months of April, May, September, October and November should be set at 65 °F. Otherwise, the temperature criteria applicable to a warm water aquatic community apply. As noted above, there are a number of problems with the current model that is used to determine compliance. It should no longer be considered sufficient to determine compliance with the temperature limits in the permit. The following recommendations are provided to assist in the development of a new means of determining the compliance of the discharges from Outfalls 002, 003 and 004 with the temperature criteria:

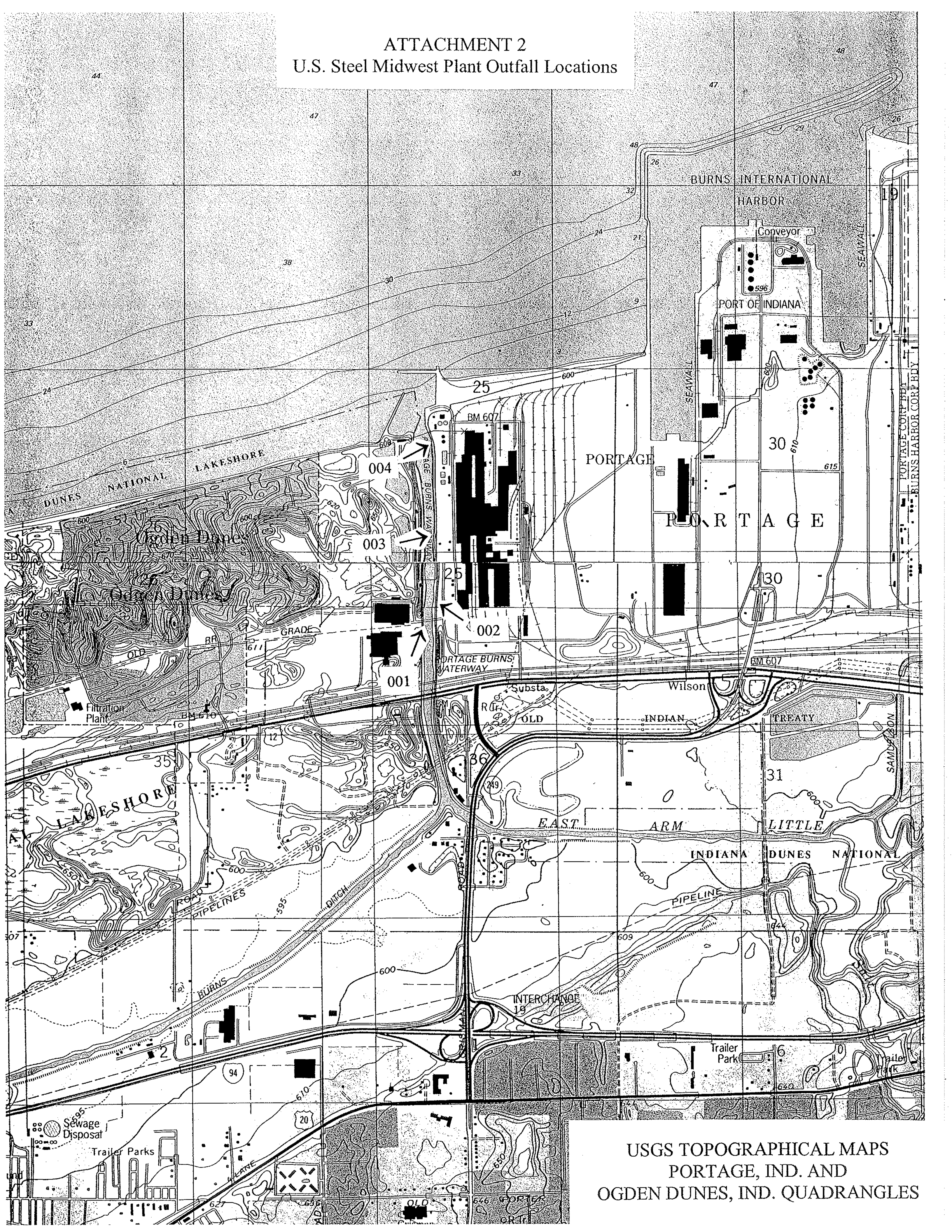
(1) If technically feasible, the best option is to install a temperature monitoring device in Portage-Burns Waterway at the edge of the mixing zone. Based on the IDEM policy of allowing one-half the stream for thermal mixing zones, an appropriate thermal mixing zone for Outfalls 002, 003 and 004 would extend along Portage-Burns Waterway from Outfall 002 to mid-stream and then downstream to a point at mid-stream and downstream of Outfall 004. The distance from Outfall 004 to the mouth of Portage-Burns Waterway is about 350 feet. Considering the width of Portage-Burns Waterway, a mid-stream point about 300 feet downstream of Outfall 004 could be considered the edge of the mixing zone. A temperature monitoring device would be installed at this point.

(2) The modeling of thermal mixing zones advanced significantly with the introduction of CORMIX 3 in 1993 and with subsequent revisions. The USGS installed a flow gage upstream of Outfall 002 in 1994 and long-term temperature data upstream of Outfall 002 and for the specific outfalls are available. In addition, instrumentation is available to monitor the dynamic flow regime in Portage-Burns Waterway to determine the frequency of reverse flows in the vicinity of the outfalls. Therefore, it should now be possible to do a more sophisticated analysis to determine the impact of Outfalls 002, 003 and 004 on the temperature of Portage-Burns Waterway and to develop a more refined model.

ATTACHMENT 1
U.S. Steel Midwest Plant Monthly Average Flows

Date	Outfall 001 (mgd)	Outfall 002 (mgd)	Outfall 003 (mgd)	Outfall 004 (mgd)	Outfall 104 (mgd)
Oct-06	0.043	6.963	17.636	43.197	7.259
Nov-06	0.036	7.079	17.428	42.176	7.283
Dec-06	0.056	6.944	18.611	23.276	6.654
Jan-07	0.044	6.583	18.672	26.105	6.927
Feb-07	0.199	5.404	16.051	20.258	6.791
Mar-07	0.053	5.411	15.341	21.344	7.33
Apr-07	0.052	5.377	15.724	20.251	7.492
May-07	0.029	5.364	15.807	21.477	8.072
Jun-07	0.019	5.396	15.984	23.021	8.402
Jul-07	0.021	5.301	16.722	20.356	8.446
Aug-07	0.068	5.683	17.614	43.753	8.488
Sep-07	0.011	5.404	16.557	29.214	8.525
Oct-07	0.028	5.592	16.655	30.224	8.514
Nov-07	0.023	5.117	15.278	36.456	8.17
Dec-07	0.004	5.403	15.585	36.081	7.369
Jan-08	0.003	5.584	15.421	20.808	7.648
Feb-08	0.006	5.416	15.371	16.845	6.914
Mar-08	0.00029	5.424	15.507	21	7.126
Apr-08	0.00047	5.418	16.161	21.469	7.881
May-08	0.00036	5.443	17.051	21.981	8.485
Jun-08	0.00037	5.395	16.864	21.628	8.325
Jul-08	0.00026	5.397	17.014	23.146	8.731
Aug-08	0.000097	5.427	17.033	26.703	8.913
Sep-08	0.007	5.435	16.521	30.398	9.051
Maximum	**0.199**	**7.079**	**18.672**	**43.753**	**9.051**

ATTACHMENT 2
U.S. Steel Midwest Plant Outfall Locations



USGS TOPOGRAPHICAL MAPS
PORTAGE, IND. AND
OGDEN DUNES, IND. QUADRANGLES

ATTACHMENT 3
Calculation of Water Quality-based Effluent Limitations

2/27/2009
12:38 PM

Discharger Name:	U.S. Steel - Midwest Plant Outfalls 002, 003 and 004
Receiving Stream:	Portage-Burns Waterway

			Mixing Zone
Discharge Flow	=	69.58 mgd	
Q1,10 receiving stream (Outfall)	=	57 mgd	
Q7,10 receiving stream (Outfall)	=	71 mgd	25%
Summer Stream Temperature (75th percentile)	=	C	
Summer Stream pH (75th percentile)	=	s.u.	
Winter Stream Temperature (75th percentile)	=	C	
Winter Stream pH (75th percentile)	=	s.u.	
Discharge-Induced Mixing Dilution Ratio (S)			

Discharge-Induced Mixing (DIM)	No

Source of Criteria [1]							Background	Samples/		CAS		Indiana Water Quality Criteria for the Great Lakes System (ug/l)							Water Quality-based Effluent Limitations (calculated in accordance with 327 IAC 5-2-11.4 and 11.6)					
												A	B	C	D	E	F	G						
												Aquatic Life Criteria		Human Health Noncancer Criteria		Human Health Cancer Criteria		Wildlife Criteria	Concentration (ug/l)		Mass (lbs/day)		Criteria	
A	B	C	D	E	F	G	(ug/l)	Month	CV	Number	Parameters	Acute (CMC)	Chronic (CCC)	Drinking (HNC-D)	Nondrinking (HNC-N)	Drinking (HCC-D)	Nondrinking (HCC-N)	(WC)	Average	Maximum	Average	Maximum	Type	Basis
1	1						0	4	0.6	7782505	Chlorine (total residual)	19	11						10	20	5.8	12	Tier I	CCC

[1] Source of Criteria
1) Indiana numeric water quality criterion; 327 IAC 2-1.5-8(c)(5).

Last revised: 21 November 2008

ATTACHMENT 4
Data From Fixed Station BD 1

Date	Summer Ammonia-N (mg/l)	Adjusted Summer Ammonia-N (mg/l)
5/8/2003	0.2	0.2
6/5/2003	0.2	0.2
7/1/2003	0.2	0.2
8/4/2003	0.1	0.1
9/4/2003	0.2	0.2
10/7/2003	0.1	0.1
11/17/2003	0.1	0.1
5/17/2004	0.2	0.2
6/2/2004	< 0.1	0.063
7/7/2004	0.1	0.1
8/10/2004	0.2	0.2
9/1/2004	< 0.1	0.063
10/5/2004	0.2	0.2
11/3/2004	< 0.1	0.063
5/9/2005	0.3	0.3
6/13/2005	0.2	0.2
7/11/2005	< 0.1	0.063
8/3/2005	< 0.1	0.063
9/12/2005	0.1	0.1
10/11/2005	0.2	0.2
11/15/2005	0.2	0.2
5/15/2006	0.2	0.2
6/27/2006	< 0.1	0.063
7/26/2006	< 0.1	0.063
8/28/2006	0.1	0.1
9/14/2006	< 0.1	0.063
10/2/2006	0.1	0.1
11/15/2006	< 0.1	0.063
5/23/2007	0.1	0.1
6/12/2007	0.2	0.2
7/24/2007	< 0.1	0.063
8/22/2007	< 0.1	0.063
9/4/2007	0.1	0.1
10/10/2007	< 0.1	0.063
11/29/2007	< 0.1	0.063
Geomean		**0.11**
Maximum		**0.3**

Date	Winter Ammonia-N (mg/l)	Adjusted Winter Ammonia-N (mg/l)
12/12/2002	0.2	0.2
1/8/2003	0.3	0.3
2/6/2003	0.4	0.4
3/11/2003	0.4	0.4
4/9/2003	0.2	0.2
12/3/2003	0.3	0.3
1/5/2004	0.3	0.3
2/23/2004	0.2	0.2
3/15/2004	0.2	0.2
4/12/2004	0.2	0.2
12/15/2004	0.3	0.3
1/3/2005	0.2	0.2
2/2/2005	0.3	0.3
3/28/2005	0.1	0.1
4/11/2005	< 0.1	0.095
12/19/2005	0.3	0.3
1/30/2006	0.1	0.1
2/22/2006	0.2	0.2
3/13/2006	0.1	0.1
4/5/2006	0.1	0.1
12/4/2006	0.1	0.1
1/17/2007	0.139	0.139
2/26/2007	0.317	0.317
3/15/2007	0.192	0.192
4/12/2007	0.2	0.2
Geomean		**0.20**
Maximum		**0.4**

ATTACHMENT 5
Data From Fixed Station BD 1

Date	Stream Flow (cfs)	Total Arsenic (ug/l)	Adjusted Total Arsenic (ug/l)	Barium (ug/l)	Total Cadmium (ug/l)	Adjusted Total Cadmium (ug/l)	Chloride (mg/l)	Total Chromium (ug/l)	Adjusted Total Chromium (ug/l)
1/8/2003	254	< 1.2	1	37.7	< 1	0.5	70	< 1.2	0.6
2/6/2003	329	1.41	1.41	43.9	< 1	0.5	98	< 1.2	0.6
3/11/2003	313	1.38	1.38	44.1	< 1	0.5	107	< 1.2	0.6
4/9/2003	786	2.54	2.54	45.9	< 1	0.5	110	2.46	2.46
5/8/2003	1470	2.67	2.67	60.8	< 1	0.5	59	4.58	4.58
6/5/2003	539	2.22	2.22	48.6	< 1	0.5	78	1.41	1.41
7/1/2003	248	2.16	2.16	39.4	< 1	0.5	54	1.63	1.63
8/4/2003	720	2.29	2.29	45.2	< 1	0.5	57	1.26	1.26
9/4/2003	360	2.26	2.26	47	< 1	0.5	58	< 1.2	0.6
10/7/2003	315	1.31	1.31	38.5	< 1	0.5	48	< 1.2	0.6
11/17/2003	403	1.76	1.76	40.4	< 1	0.5	61	< 1.2	0.6
12/3/2003	472	2.27	2.27	43.8	< 1	0.5	65	< 1.2	0.6
1/5/2004	397	< 1.2	1	46	< 1	0.5	79	< 1.2	0.6
2/23/2004	915	1.8	1.8	50.7	< 1	0.5	147	1.33	1.33
3/15/2004	537	< 1.2	1	40.8	< 1	0.5	89	< 1.2	0.6
4/12/2004	383	1.7	1.7	44.3	< 1	0.5	74	< 1.2	0.6
5/17/2004	829	2.35	2.35	45.9	< 1	0.5	82	1.81	1.81
6/2/2004	1550	2.87	2.87	50.3	< 1	0.5	44	2.39	2.39
7/7/2004	413	1.89	1.89	41.8	< 1	0.5	73	< 1.2	0.6
8/10/2004	268	1.6	1.6	38.2	< 1	0.5	55	< 1.2	0.6
9/1/2004	665	2.13	2.13	44	< 1	0.5	52	< 1.2	0.6
10/5/2004	296	1.49	1.49	32.8	< 1	0.5	47	< 1.2	0.6
11/3/2004	875	2.27	2.27	49.4	< 1	0.5	60	1.69	1.69
12/15/2004	712	< 1.2	1	35.3	< 1	0.5	56	< 1.2	0.6
1/3/2005	1150	1.37	1.37	41.9	< 1	0.5	76	2.28	2.28
2/2/2005	441	< 1.2	1	38.6	< 1	0.5	99	< 1.2	0.6
3/28/2005	623	1.39	1.39	40.4	< 1	0.5	104	< 1.2	0.6
4/11/2005	321	2.14	2.14	41.7	< 1	0.5	68	< 1.2	0.6
5/9/2005	305	1.3	1.3	39.3	< 1	0.5	72	< 1.2	0.6
6/13/2005	396	1.88	1.88	38.3	< 1	0.5	68	< 1.2	0.6
7/11/2005	265	1.5	1.5	29.4	< 1	0.5	38	< 1.2	0.6
8/3/2005	257	1.42	1.42	31.9	< 1	0.5	44	< 1.2	0.6
9/12/2005	249	1.26	1.26	31.5	< 1	0.5	48	< 1.2	0.6
10/11/2005	238	< 1.2	1	33.2	< 1	0.5	50	< 1.2	0.6
11/15/2005	288	1.4	1.4	34.4	< 1	0.5	59	< 1.2	0.6
12/19/2005	384	1.5	1.5	35.4	< 1	0.5	83	< 1.2	0.6
1/30/2006	854	< 1.2	1	49.8	< 1	0.5	106	2.2	2.2
2/22/2006	406	< 1.2	1	38.6	< 1	0.5	100	1.52	1.52
3/13/2006	1750	3.44	3.44	86.2	< 1	0.5	75	11.3	11.3
4/5/2006	494	1.27	1.27	43.6	< 1	0.5	88	< 1.2	0.6
5/15/2006	943	1.52	1.52	47.1	< 1	0.5	79	2.13	2.13
6/27/2006	367	1.42	1.42	33.3	< 1	0.5	55	< 1.2	0.6
7/26/2006	430	1.81	1.81	37.4	< 1	0.5	44	1.23	1.23
8/28/2006	681	1.94	1.94	39.9	< 1	0.5	53	1.32	1.32
9/14/2006	2580	2.97	2.97	64.2	< 1	0.5	35	4.64	4.64
10/2/2006	417	1.62	1.62	44.4	< 1	0.5	61	1.75	1.75
11/15/2006	618	1.23	1.23	40.1	< 1	0.5	62	1.31	1.31
12/4/2006	2090	< 1.2	1	41.7	< 1	0.5	49	1.99	1.99
1/17/2007	1670	< 1.2	1	35.4	< 1	0.5	47	2.3	2.3
2/26/2007	1530	1.28	1.28	41.1	< 1	0.5	120	2.42	2.42
3/15/2007	970	1.28	1.28	41.4	< 1	0.5	87	1.78	1.78
4/12/2007	1400	1.4	1.4	41.2	< 1	0.5	81	2.69	2.69
5/23/2007	418	1.41	1.41	42.8	< 1	0.5	64	< 1.2	0.6
6/12/2007	315	1.79	1.79	40.7	< 1	0.5	69	< 1.2	0.6
7/24/2007	324	1.89	1.89	37.6	< 1	0.5	64	< 1.2	0.6
8/22/2007	3190	2.32	2.32	46.2	< 1	0.5	32	2.73	2.73
9/4/2007	675	2.62	2.62	40.1	< 1	0.5	49	< 1.2	0.6
10/10/2007	332	1.89	1.89	40.4	< 1	0.5	61	< 1.2	0.6
11/29/2007	364	1.63	1.63	37.7	< 1	0.5	63	< 1.2	0.6
12/20/2007	511	1.33	1.33	36	< 1	0.5	63	< 1.2	0.6
Geomean			**1.6**	**42**		**0.5**	**66**		**1.0**
Maximum			**3.44**	**86.2**		**0.5**	**147**		**11.3**

ATTACHMENT 6
Data From Fixed Station BD 1

Date	Stream Flow (cfs)	Hexavalent Chromium (ug/l)	Adjusted Hexavalent Chromium (ug/l)	Total Copper (ug/l)	Total Cyanide (mg/l)	Adjusted Total Cyanide (mg/l)	Fluoride (mg/l)	Total Lead (ug/l)	Adjusted Total Lead (ug/l)
1/8/2003	254			1.74	< 0.005	0.0025	0.7	1.93	1.93
2/6/2003	329	< 10	5	1.99	< 0.005	0.0025	0.6	< 1	0.82
3/11/2003	313	< 10	5	2.72	< 0.005	0.0025	0.8	1.96	1.96
4/9/2003	786	< 10	5	2.74	< 0.005	0.0025	0.5	1.61	1.61
5/8/2003	1470	< 10	5	6.2	< 0.005	0.0025	0.4	6.04	6.04
6/5/2003	539	< 10	5	2.2	< 0.005	0.0025	0.5	1.42	1.42
7/1/2003	248	< 10	5	3.31	< 0.005	0.0025	0.6	1.62	1.62
8/4/2003	720	< 10	5	3.89	< 0.005	0.0025	0.4	1.18	1.18
9/4/2003	360	< 10	5	2.41	< 0.005	0.0025	0.7	1.16	1.16
10/7/2003	315	< 10	5	2.83	< 0.005	0.0025		1.01	1.01
11/17/2003	403	< 10	5	2.29	< 0.005	0.0025		1.3	1.3
12/3/2003	472	< 10	5	2.14	< 0.005	0.0025	0.5	< 1	0.82
1/5/2004	397	< 10	5	2.18	< 0.005	0.0025	0.6	1.1	1.1
2/23/2004	915	< 10	5	2.68	< 0.005	0.0025	0.4	1.37	1.37
3/15/2004	537	< 10	5	2.31	< 0.005	0.0025	0.6	1.5	1.5
4/12/2004	383	< 10	5	2.83	< 0.005	0.0025	0.6	1.62	1.62
5/17/2004	829	< 10	5	3.32	< 0.005	0.0025	0.6	2.46	2.46
6/2/2004	1550	< 10	5	4.33	< 0.005	0.0025	0.3	2.56	2.56
7/7/2004	413	< 10	5	2.48	< 0.005	0.0025	0.5	1.23	1.23
8/10/2004	268	< 10	5	2.09	< 0.005	0.0025	0.7	4.17	4.17
9/1/2004	665			2.73	< 0.005	0.0025	0.4	1.65	1.65
10/5/2004	296	< 10	5	2.08	< 0.005	0.0025	0.6	2.56	2.56
11/3/2004	875	< 10	5	3.59	< 0.005	0.0025	0.2	2.73	2.73
12/15/2004	712	< 10	5	2.12	< 0.005	0.0025	0.5	1.25	1.25
1/3/2005	1150			3.76	< 0.005	0.0025	0.3	2.77	2.77
2/2/2005	441			1.98	< 0.005	0.0025	0.5	< 1	0.82
3/28/2005	623	< 10	5	1.83	< 0.005	0.0025	0.4	< 1	0.82
4/11/2005	321	< 10	5	2.04	< 0.005	0.0025	0.4	< 1	0.82
5/9/2005	305	< 10	5	2.33	< 0.005	0.0025	0.6	1.14	1.14
6/13/2005	396	< 10	5	3.07	< 0.005	0.0025	0.6	5.96	5.96
7/11/2005	265	< 10	5	2.14	< 0.005	0.0025	0.6	1.23	1.23
8/3/2005	257	< 10	5	1.93	< 0.005	0.0025	0.6	< 1	0.82
9/12/2005	249	< 10	5	2.22	< 0.005	0.0025	0.7	1.27	1.27
10/11/2005	238	< 10	5	2.85	< 0.005	0.0025	0.6	< 1	0.82
11/15/2005	288	< 10	5	2.15	< 0.005	0.0025	0.4	1.22	1.22
12/19/2005	384			2.28	< 0.005	0.0025	0.7	< 1	0.82
1/30/2006	854	< 10	5	3.88	< 0.005	0.0025	0.4	2.07	2.07
2/22/2006	406	< 10	5	2.83	< 0.005	0.0025	0.6	1.33	1.33
3/13/2006	1750	< 10	5	11.8	< 0.005	0.0025	0.2	12.6	12.6
4/5/2006	494	< 10	5	2.62	< 0.005	0.0025	0.5	1.18	1.18
5/15/2006	943	< 10	5	3.58	< 0.005	0.0025	0.4	2.17	2.17
6/27/2006	367	< 10	5	2.45			0.6	1.19	1.19
7/26/2006	430	< 10	5	2.98			0.5	1.64	1.64
8/28/2006	681	< 10	5	2.97			0.5	1.72	1.72
9/14/2006	2580	< 10	5	7.34			0.2	6.27	6.27
10/2/2006	417	< 10	5	3.95			0.5	1.9	1.9
11/15/2006	618	< 10	5	2.87			0.5	< 1	0.82
12/4/2006	2090			3.04			0.3	1.46	1.46
1/17/2007	1670			2.62			0.23	1.18	1.18
2/26/2007	1530			4.28			0.3	2.39	2.39
3/15/2007	970	< 10	5	3.14			0.41	2	2
4/12/2007	1400	< 10	5	4.36			0.3	2.62	2.62
5/23/2007	418	< 10	5	2.82			0.4	1.16	1.16
6/12/2007	315	< 10	5	2.71			0.4	1.21	1.21
7/24/2007	324	< 10	5	2.27			0.7	< 1	0.82
8/22/2007	3190			4.56			0.2	2.68	2.68
9/4/2007	675	< 10	5	2.42			0.4	< 1	0.82
10/10/2007	332	< 10	5	2.64			0.6	1.01	1.01
11/29/2007	364	< 10	5	2.35			0.5	1.95	1.95
12/20/2007	511			2.38			0.4	1.04	1.04
Geomean			**5**	**2.8**		**0.0025**	**0.46**		**1.6**
Maximum			**5**	**11.8**		**0.0025**	**0.8**		**12.6**

ATTACHMENT 7
Data From Fixed Station BD 1

Date	Stream Flow (cfs)	Total Manganese (ug/l)	Total Nickel (ug/l)	Total Selenium (ug/l)	Adjusted Total Selenium (ug/l)	Total Silver (ug/l)	Adjusted Total Silver (ug/l)	Sulfate (mg/l)	Total Zinc (ug/l)	Adjusted Total Zinc (ug/l)
1/8/2003	254	96.6	2.59	< 1.2	0.6	< 1	0.5	76	9.27	9.27
2/6/2003	329	109	3.02	< 1.2	0.6	< 1	0.5	92	8.58	8.58
3/11/2003	313	135	3.54	1.41	1.41	< 1	0.5	91	7.4	7.4
4/9/2003	786	107	3.44	< 1.2	0.6	< 1	0.5	95	8.43	8.43
5/8/2003	1470	227	6.27	< 1.2	0.6	< 1	0.5	64	23.3	23.3
6/5/2003	539	100	4	1.34	1.34	< 1	0.5	84	7.02	7.02
7/1/2003	248	96.2	3.87	< 1.2	0.6	< 1	0.5	64	7	7
8/4/2003	720	110	2.39	< 1.2	0.6	< 1	0.5	53	7.42	7.42
9/4/2003	360	95.5	2.75	< 2	1	< 1	0.5	72	< 6	4.9
10/7/2003	315	71.8	2.36	< 2	1	< 1	0.5	63	< 6	4.9
11/17/2003	403	94.7	2.48	< 2	1	< 1	0.5	66	6.72	6.72
12/3/2003	472	76.3	2.39	< 2	1	< 1	0.5	78	< 6	4.9
1/5/2004	397	90.7	2.26	< 2	1	< 1	0.5	91	< 6	4.9
2/23/2004	915	163	2.74	< 2	1	< 1	0.5	90	11.4	11.4
3/15/2004	537	90	2.35	< 2	1	< 1	0.5	80	< 6	4.9
4/12/2004	383	93.4	2.82	< 2	1	< 1	0.5	85	6.81	6.81
5/17/2004	829	133	3.22	< 2.2	1.1	< 1	0.5	69	9.62	9.62
6/2/2004	1550	116	3.15	2.69	2.69	< 1	0.5	50	12.4	12.4
7/7/2004	413	110	2.23			< 1	0.5	71	< 6	4.9
8/10/2004	268	88	2.28	< 2.2	1.1	< 1	0.5	70	< 6	4.9
9/1/2004	665	98	2.35	< 2.2	1.1	< 1	0.5	59	7.65	7.65
10/5/2004	296	56	1.73	< 2.2	1.1	< 1	0.5	64	< 6	4.9
11/3/2004	875	143	2.87	< 2.2	1.1	< 1	0.5	83	14.2	14.2
12/15/2004	712	80.1	2.26	< 2.2	1.1	< 1	0.5	74	7	7
1/3/2005	1150	105	2.86	< 2.2	1.1	< 1	0.5	62	15.1	15.1
2/2/2005	441	125	2.29	< 2.2	1.1	9.2	9.2	75	8.42	8.42
3/28/2005	623	89.8	1.92	< 2.2	1.1	< 1	0.5	74	< 6	4.9
4/11/2005	321	99.6	1.65	5.56	5.56	< 1	0.5	81	< 6	4.9
5/9/2005	305	106	1.94	< 2.2	1.1	< 1	0.5	76	8.26	8.26
6/13/2005	396	151	2.31	< 2.2	1.1	< 1	0.5	66	9.49	9.49
7/11/2005	265	62.7	1.68	< 2.2	1.1	< 1	0.5	44	6.72	6.72
8/3/2005	257	69.7	1.58	< 2.2	1.1	< 1	0.5	48	< 6	4.9
9/12/2005	249	72.4	2.11	< 2.2	1.1	< 1	0.5	54	6.89	6.89
10/11/2005	238	64.6	2.52	< 2.2	1.1	< 1	0.5	53	7.59	7.59
11/15/2005	288	74.6	3.02	< 2.2	1.1	< 1	0.5	67	8.58	8.58
12/19/2005	384	86.9	2.69	< 2.2	1.1	< 1	0.5	77	9.72	9.72
1/30/2006	854	100	2.75	< 2.2	1.1	< 1	0.5	96	21.5	21.5
2/22/2006	406	98.5	2.68	< 2.2	1.1	< 1	0.5	95	11.4	11.4
3/13/2006	1750	384	9.89	< 2.2	1.1	< 1	0.5	65	56.8	56.8
4/5/2006	494	109	2.31	< 2.2	1.1	< 1	0.5	92	8.78	8.78
5/15/2006	943	111	2.91	< 2.2	1.1	< 1	0.5	76	12.3	12.3
6/27/2006	367	69.5	1.88	< 2.2	1.1	< 1	0.5	58	9.54	9.54
7/26/2006	430	85.6	2.06	< 2.2	1.1	< 1	0.5	46	12.5	12.5
8/28/2006	681	101	2.4	< 2.2	1.1	< 1	0.5	50	10.9	10.9
9/14/2006	2580	268	5.33	< 2.2	1.1	< 1	0.5	34	30.9	30.9
10/2/2006	417	129	2.55	< 2.2	1.1	< 1	0.5	55	11.4	11.4
11/15/2006	618	84.4	2.61	< 2.2	1.1	< 1	0.5	67	8.58	8.58
12/4/2006	2090	94.7	2.8	< 2.2	1.1	< 1	0.5	50	11.4	11.4
1/17/2007	1670	69.8	2.46	< 2.2	1.1	< 1	0.5	55.5	8.76	8.76
2/26/2007	1530	214	2.97	< 2.2	1.1	< 1	0.5	48.7	15.1	15.1
3/15/2007	970	114	2.74	< 2.2	1.1	< 1	0.5	58.7	15.4	15.4
4/12/2007	1400	178	3.27	< 2.2	1.1	< 1	0.5	69	20.9	20.9
5/23/2007	418	104	2.57	< 2.2	1.1	< 1	0.5	48	8.44	8.44
6/12/2007	315	108	2.88	2.28	2.28	< 1	0.5	68	8.68	8.68
7/24/2007	324	91.5	2.36	< 2.2	1.1	< 1	0.5	52	6.93	6.93
8/22/2007	3190	121	3.48	< 2.2	1.1	< 1	0.5	45	14.6	14.6
9/4/2007	675	327	2.25	< 2.2	1.1	< 1	0.5	50	7.91	7.91
10/10/2007	332	112	2.6	< 2.2	1.1	< 1	0.5	65	8.44	8.44
11/29/2007	364	94.2	2.13	< 2.2	1.1	< 1	0.5	70	10.2	10.2
12/20/2007	511	95.4	2.03	< 2.2	1.1	< 1	0.5	67	8.95	8.95
Geomean		**107**	**2.6**		**1.1**		**0.52**	**66**		**9.1**
Maximum		**384**	**9.89**		**5.56**		**9.2**	**96**		**56.8**

ATTACHMENT 8
Data From Deep River Trace Metals Sampling

Date	Total Antimony (ug/l)	Adjusted Total Antimony (ug/l)	Total Barium (ug/l)	Total Beryllium (ug/l)	Total Cadmium (ug/l)	Adjusted Total Cadmium (ug/l)	Hexavalent Chromium (ug/l)	Adjusted Hexavalent Chromium (ug/l)
4/24/2002	0.29	0.29	38	0.0445	0.033	0.033	0.2	0.2
7/10/2002	0.3	0.3	41	0.0151	< 0.037	0.028	< 0.6	0.3
10/22/2002	0.35	0.35	40	0.0173	< 0.037	0.028	< 0.6	0.3
1/14/2003	0.35	0.35	36	0.0104	0.013	0.013	< 0.6	0.3
5/20/2003	0.5	0.5	49	0.0322	< 0.037	0.028	< 0.6	0.3
8/19/2003	0.5	0.5	36	0.0193	< 0.037	0.028	< 0.6	0.3
11/18/2003	< 0.73	0.64	40	0.0208	0.013	0.013	< 0.6	0.3
2/24/2004	< 0.73	0.64	39	0.0183	0.031	0.031	< 0.6	0.3
9/8/2004	0.26	0.26	37	0.0205	0.02	0.02		
10/20/2004	0.22	0.22	38	0.023	0.039	0.039		
3/10/2005	0.22	0.22	41	0.0198	0.029	0.029		
6/23/2005	0.3	0.3	28	0.0189	0.017	0.017		
9/1/2005	0.29	0.29	38	0.0208	0.022	0.022		
12/8/2005	0.27	0.27	47	0.0208	0.03	0.03		
3/16/2006	0.3	0.3	45	0.102	0.038	0.038		
5/25/2006	0.25	0.25	47	0.0157	0.023	0.023		
Geomean		**0.33**	**40**	**0.022**		**0.025**		**0.3**
Maximum		**0.64**	**49**	**0.102**		**0.039**		**0.3**

ATTACHMENT 9
Data From Deep River Trace Metals Sampling

Date	Fluoride (mg/l)	Total Manganese (ug/l)	Total Selenium (ug/l)	Adjusted Total Selenium (ug/l)	Total Silver (ug/l)	Adjusted Total Silver (ug/l)	Total Thallium (ug/l)
4/24/2002	0.21	73	1	1	0.0236	0.0236	0.0279
7/10/2002	0.3	187	< 0.9	0.45	< 0.014	0.011	0.007
10/22/2002	0.2	74	< 0.9	0.45	0.0081	0.0081	0.0102
1/14/2003	0.23	61	< 0.9	0.45	0.0078	0.0078	0.0102
5/20/2003	0.23	204	< 0.9	0.45	0.0144	0.0144	0.0238
8/19/2003	0.22	100	< 0.9	0.45	0.0155	0.0155	0.0096
11/18/2003	0.25	106	< 0.9	0.45	0.0104	0.0104	0.0079
2/24/2004	0.22	183	0.6	0.6	0.0256	0.0256	0.0164
9/8/2004		106	< 0.9	0.45	0.0073	0.0073	0.009
10/20/2004		60	< 0.9	0.45	0.0078	0.0078	0.0113
3/10/2005		77	0.5	0.5	0.0195	0.0195	0.0202
6/23/2005		101	0.5	0.5	< 0.014	0.011	0.0151
9/1/2005		121	0.6	0.6	< 0.014	0.011	0.0079
12/8/2005		86.6	0.7	0.7	0.0493	0.0493	0.0145
3/16/2006	0.18	72.5	0.7	0.7	0.0258	0.0258	0.0476
5/25/2006		66.5	1	1	0.0197	0.0197	0.0113
Geomean	**0.22**	**97**		**0.6**		**0.014**	**0.013**
Maximum	**0.3**	**204**		**1**		**0.0493**	**0.0476**

ATTACHMENT 10
Lake Michigan Data From BP Products April 2002 Permit Renewal Application

Date	Total Boron (mg/l)	Total Cobalt (ug/l)	Total Molybdenum (mg/l)	Adjusted Total Molybdenum (mg/l)	Total Tin (mg/l)	Adjusted Total Tin (mg/l)	Total Titanium (mg/l)	Adjusted Total Titanium (mg/l)	Total Vanadium (mg/l)
9/5/2001		0.16	0.001	0.001	<0.01	0.005	<0.025	0.012	
9/10/2001		0.9	0.0012	0.0012	<0.01	0.005	<0.025	0.012	
9/12/2001		0.11	<0.001	0.00085	<0.01	0.005	<0.025	0.012	
9/13/2001		0.28	<0.001	0.00085	<0.01	0.005	<0.025	0.012	
9/18/2001		0.49	0.0009	0.0009	<0.01	0.005	<0.025	0.012	
10/1/2001		0.16	0.00086	0.00086	<0.01	0.005	<0.025	0.012	
10/3/2001		0.89	0.00078	0.00078	<0.01	0.005	<0.025	0.012	
6/24/1998	0.029		0.00129	0.00129					0.00169
6/24/1998	0.0209		0.00053	0.00053					0.0022
8/31/1998	0.064		0.00134	0.00134					0.00317
8/31/1998	0.0196		0.00115	0.00115					0.0026
8/31/1998	0.06		0.00127	0.00127					0.00336
11/4/1998			0.0015	0.0015					0.0092
Geomean	**0.034**	**0.32**		**0.001**		**0.005**		**0.012**	**0.0031**

ATTACHMENT 11
Data From Fixed Station BD 1

Date	Stream Flow (cfs)	Naphthalene (ug/l)	Adjusted Naphthalene (ug/l)	Total Phenolics (ug/l)	Adjusted Total Phenolics (ug/l)
1/25/2000	222			< 5	2.5
2/15/2000	417			< 5	2.5
3/21/2000	530			< 5	2.5
3/29/2000	348	< 0.1	0.05		
4/24/2000	1200			< 5	2.5
4/26/2000	766	< 0.1	0.05		
5/4/2000	473	< 0.1	0.05		
5/10/2000	417	< 0.1	0.05		
5/17/2000	283	< 0.1	0.05		
5/24/2000	258	< 0.1	0.05		
5/25/2000	272			< 5	2.5
5/31/2000	482	< 0.1	0.05		
6/7/2000	862	< 0.1	0.05		
6/13/2000	732	0.4	0.4		
6/21/2000	1660	< 0.1	0.05	< 5	2.5
6/28/2000	1820	< 0.1	0.05		
7/6/2000	533	< 0.1	0.05		
7/13/2000	369	< 0.1	0.05		
7/18/2000	258			< 5	2.5
7/19/2000	239	< 0.1	0.05		
7/26/2000	252	< 0.1	0.05		
8/2/2000	278	< 0.1	0.05		
8/22/2000	239			< 5	2.5
9/20/2000	240			< 5	2.5
10/23/2000	253			< 5	2.5
11/21/2000	291			6	6
12/13/2000	307			10	10
Geomean			**0.057**		**3.0**
Maximum			**0.4**		**10**

ATTACHMENT 12
Determination of Lowest Combined 7-Day Average Flow for Outfalls 002 and 003

Comparison of Outfall 002 and Outfall 003 Discharge Flows to Stream Flow at Gaging Station

Month	Outfall 002 Ave. (mgd)	Outfall 002 Max. (mgd)	Outfall 003 Ave. (mgd)	Outfall 003 Max. (mgd)	Total of 002 and 003 Average Flows (mgd)	Total of 002 and 003 Average Flows (cfs)	04095090 Ave. (cfs)
Oct-06	6.963	7.23	17.636	18.196	24.599	38	614
Nov-06	7.079	8.063	17.428	19.203	24.507	38	572
Dec-06	6.944	7	18.611	19.045	25.555	40	1224
Jan-07	6.583	7.009	18.672	19.94	25.255	39	1144
Feb-07	5.404	5.437	16.051	17.146	21.455	33	548
Mar-07	5.411	5.457	15.341	15.453	20.752	32	1045
Apr-07	5.377	5.412	15.724	15.864	21.101	33	1423
May-07	5.364	5.44	15.807	16.312	21.171	33	554
Jun-07	5.396	5.454	15.984	16.693	21.38	33	392
Jul-07	5.301	5.459	16.722	17.004	22.023	34	412
Aug-07	5.683	6.351	17.614	19.9	23.297	36	1650
Sep-07	5.404	5.465	16.557	16.78	21.961	34	459
Oct-07	5.592	6.25	16.655	16.859	22.247	34	447
Nov-07	5.117	5.368	15.278	16.383	20.395	32	393
Dec-07	5.403	5.439	15.585	16.312	20.988	32	594
Jan-08	5.584	6.252	15.421	15.6	21.005	32	1065
Feb-08	5.416	5.449	15.371	15.652	20.787	32	971
Mar-08	5.424	5.444	15.507	15.732	20.931	32	763
Apr-08	5.418	5.455	16.161	17.165	21.579	33	924
May-08	5.443	5.496	17.051	17.152	22.494	35	685
Jun-08	5.395	5.435	16.864	17.102	22.259	34	599
Jul-08	5.397	5.444	17.014	17.433	22.411	35	491
Aug-08	5.427	5.472	17.033	17.387	22.46	35	826
Sep-08	5.435	5.463	16.521	17.048	21.956	34	2606

*Data are not available.

Determination of Lowest Combined 7-Day Average Flow

Date	Outfall 002 Daily Ave. (mgd)	Outfall 002 Weekly Ave. (mgd)	Outfall 003 Daily Ave. (mgd)	Outfall 003 Weekly Ave. (mgd)	Total of 002 and 003 Weekly Average Flows (mgd)	Total of 002 and 003 Weekly Average Flows (cfs)
10/30/2007	5.445	--	16.786	--	--	--
11/6/2007	4.522	4.984	13.371	15.079	20.062	31
11/13/2007	5.274	4.898	15.587	14.479	19.377	30
11/20/2007	5.368	5.321	16.383	15.985	21.306	33
11/27/2007	5.305	5.337	15.77	16.077	21.413	33
12/4/2007	5.439	5.372	16.312	16.041	21.413	33
12/11/2007	5.422	5.431	15.617	15.965	21.395	33
12/18/2007	5.384	5.403	15.157	15.387	20.79	32
12/25/2007	5.366	5.375	15.252	15.205	20.5795	32
1/1/2008	5.299	5.333	15.387	15.320	20.652	32

ATTACHMENT 13

Data From Fixed Station BD 1		Data From Fixed Station LM OD	
Date	**Hardness (mg/l)**	**Date**	**Hardness (mg/l)**
1/8/2003	280	1/8/2003	142
2/6/2003	326	2/6/2003	154
3/11/2003	323	3/11/2003	158
4/9/2003	316	4/9/2003	143
5/8/2003	253	5/8/2003	145
6/5/2003	314	6/5/2003	137
7/1/2003	259	7/1/2003	129
8/4/2003	266	8/4/2003	133
9/4/2003	283	9/4/2003	134
10/7/2003	250	10/7/2003	134
11/17/2003	287	11/17/2003	143
12/3/2003	315	12/3/2003	145
1/5/2004	333	1/5/2004	137
2/23/2004	336	2/23/2004	141
3/15/2004	306	3/15/2004	145
4/12/2004	294	4/12/2004	141
5/17/2004	286	5/17/2004	131
6/2/2004	230	6/2/2004	126
7/7/2004	276	7/7/2004	131
8/10/2004	261	8/10/2004	138
9/1/2004	253	9/2/2004	144
10/5/2004	255	10/5/2004	136
11/3/2004	288	11/3/2004	138
12/15/2004	275	12/15/2004	151
1/3/2005	244	1/3/2005	149
2/2/2005	311	2/2/2005	150
3/28/2005	230	3/28/2005	108
4/11/2005	292	4/12/2005	142
5/9/2005	282	5/9/2005	140
6/13/2005	261	6/14/2005	136
7/11/2005	199	7/12/2005	136
8/3/2005	218	8/22/2005	143
9/12/2005	229	9/12/2005	139
10/11/2005	226	10/11/2005	127
11/15/2005	240	11/15/2005	128
12/19/2005	273	12/19/2005	123
1/30/2006	307	1/30/2006	137
2/22/2006	314	2/22/2006	150
3/13/2006	232	3/13/2006	136
4/5/2006	330	4/5/2006	140
5/15/2006	306	5/15/2006	150
6/27/2006	221	6/27/2006	130
7/26/2006	208	7/26/2006	122
8/28/2006	229	8/28/2006	137
9/14/2006	176	9/14/2006	131
10/2/2006	279	10/3/2006	134
11/15/2006	316	11/16/2006	145
12/4/2006	250	12/4/2006	133
1/17/2007	233	1/17/2007	137
2/26/2007	240	2/26/2007	237
3/15/2007	244	3/15/2007	146
4/12/2007	267	4/11/2007	168
5/23/2007	269	5/24/2007	127
6/12/2007	286	6/13/2007	141
7/24/2007	259	7/25/2007	144
8/22/2007	205	8/22/2007	138
9/4/2007	242	9/4/2007	144
10/10/2007	276	10/10/2007	146
11/29/2007	286	11/29/2007	150
12/20/2007	289	12/20/2007	150
50th %	**271**	**50th %**	**140**

ATTACHMENT 14
Data From Fixed Station BD 1

Date	Summer pH (s.u.)
5/8/2003	7.9
6/5/2003	7.9
7/1/2003	8
8/4/2003	8
9/4/2003	7.9
10/7/2003	7.9
11/17/2003	7.7
5/17/2004	7.9
6/2/2004	7.9
7/7/2004	8.1
8/10/2004	7.8
9/1/2004	8.1
10/5/2004	8
11/3/2004	7.7
5/9/2005	8.2
6/13/2005	8.1
7/11/2005	8.2
8/3/2005	7.7
9/12/2005	7.8
10/11/2005	8
11/15/2005	7.7
5/15/2006	7.9
6/27/2006	7.9
7/26/2006	7.8
8/28/2006	7.7
9/14/2006	7.8
10/2/2006	7.9
11/15/2006	7.9
5/23/2007	8.1
6/12/2007	8.07
7/24/2007	8.1
8/22/2007	7.78
9/4/2007	7.68
10/10/2007	7.89
11/29/2007	8.11
75th %	**8.0**
Maximum	**8.2**

Date	Winter pH (s.u.)
12/12/2002	7.7
1/8/2003	7.9
2/6/2003	8
3/11/2003	7.9
4/9/2003	7.9
12/3/2003	7.7
1/5/2004	7.8
2/23/2004	7.9
3/15/2004	8.1
4/12/2004	8.2
12/15/2004	7.7
1/3/2005	7.8
2/2/2005	7.7
3/28/2005	8.2
4/11/2005	8.3
12/19/2005	7.7
1/30/2006	7.52
2/22/2006	7.8
3/13/2006	7.7
4/5/2006	8.1
12/4/2006	7.7
1/17/2007	8
2/26/2007	7.9
3/15/2007	7.9
4/12/2007	7.9
75th %	**8.0**
Maximum	**8.3**

ATTACHMENT 15
Data From Fixed Station BD 1

Date	Summer Temp. (°C)
5/8/2003	14.8
6/5/2003	16.7
7/1/2003	24.3
8/4/2003	25.3
9/4/2003	21.5
10/7/2003	15.6
11/17/2003	12.5
5/17/2004	20.4
6/2/2004	17.9
7/7/2004	23.8
8/10/2004	23.3
9/1/2004	23.1
10/5/2004	15.8
11/3/2004	12.9
5/9/2005	19.5
6/13/2005	25.5
7/11/2005	24.3
8/3/2005	27.5
9/12/2005	26.7
10/11/2005	18.3
11/15/2005	12.9
5/15/2006	13.9
6/27/2006	22.1
7/26/2006	25.5
8/28/2006	23.1
9/14/2006	18.6
10/2/2006	19.4
11/15/2006	9.3
5/23/2007	23.2
6/12/2007	24.24
7/24/2007	24.61
8/22/2007	21.36
9/4/2007	24.93
10/10/2007	17.75
11/29/2007	4.11
75th %	**24**
Maximum	**27.5**

Date	Winter Temp. (°C)
12/12/2002	7.5
1/8/2003	6.7
2/6/2003	4.7
3/11/2003	3
4/9/2003	8.6
12/3/2003	5.2
1/5/2004	4.2
2/23/2004	5.2
3/15/2004	7.8
4/12/2004	11.6
12/15/2004	5.3
1/3/2005	5.7
2/2/2005	5.4
3/28/2005	10.2
4/11/2005	15.9
12/19/2005	1.7
1/30/2006	6.62
2/22/2006	6.2
3/13/2006	12.5
4/5/2006	12.3
12/4/2006	2
1/17/2007	1
2/26/2007	2.6
3/15/2007	8.2
4/12/2007	6.6
75th %	**8.2**
Maximum	**15.9**

ATTACHMENT 16
Calculation of Preliminary Effluent Limitations

2/27/2009
12:44 PM

Discharger Name:	U.S. Steel - Midwest Plant Outfall 004
Receiving Stream:	Portage-Burns Waterway

			Mixing Zone
Discharge Flow	=	43.8 mgd	
Q1,10 receiving stream (Outfall)	=	57 mgd	
Q7,10 receiving stream (Outfall)	=	90 mgd	25%
Q7,10 receiving stream (Industrial Water Supply)	=	mgd	25%
Harmonic Mean Flow (Outfall)	=	247 mgd	25%
Harmonic Mean Flow (Drinking Water Intake)	=	mgd	25%
Q90,10 receiving stream	=	140 mgd	25%
Discharge-Induced Mixing Dilution Ratio (S)	=		
Hardness (50th percentile)	=	271 mg/l	
Stream pH (50th percentile)	=	s.u.	
Summer Stream Temperature (75th percentile)	=	24 C	
Summer Stream pH (75th percentile)	=	8.0 s.u.	
Winter Stream Temperature (75th percentile)	=	8.2 C	
Winter Stream pH (75th percentile)	=	8.0 s.u.	

Discharge-Induced Mixing (DIM)	No
Drinking Water Intake Downstream	No
Industrial Water Supply Downstream	No

Metals Translators
(dissolved to total recoverable)

	Acute	Chronic
Aluminum		
Antimony	1.000	1.000
Arsenic	1.000	1.000
Barium	1.000	1.000
Beryllium	1.000	1.000
Cadmium	0.902	0.867
Chromium III	0.316	0.860
Chromium VI	0.982	0.962
Cobalt	1.000	1.000
Copper	0.960	0.960
Iron		
Lead	0.646	0.646
Manganese	1.000	1.000
Mercury	0.85	0.85
Molybdenum	1.000	1.000
Nickel	0.998	0.997
Selenium		0.922
Silver	0.85	1.000
Strontium	1.000	1.000
Thallium	1.000	1.000
Tin	1.000	1.000
Titanium	1.000	1.000
Vanadium	1.000	1.000
Zinc	0.978	0.986

Source of Criteria [1]							Background	BCC	Add.	Samples/	CV	CAS		Indiana Water Quality Criteria for the Great Lakes System (ug/l)							Preliminary Effluent Limitations (calculated in accordance with 327 IAC 5-2-11.4 and 11.6)					
														A	B	C	D	E	F	G						
														Aquatic Life Criteria		Human Health Noncancer Criteria		Human Health Cancer Criteria		Wildlife Criteria	Concentration (ug/l)[3]		Mass (lbs/day)		Criteria	
														Acute	Chronic	Drinking	Nondrinking	Drinking	Nondrinking							
A	B	C	D	E	F	G	(ug/l)			Month		Number	Parameters[2]	(CMC)	(CCC)	(HNC-D)	(HNC-N)	(HCC-D)	(HCC-N)	(WC)	Average	Maximum	Average	Maximum	Type	Basis
4	4	3	3				0.33			4	0.6	7440360	Antimony	720	80	10	2000				99	200	36	73	Tier II	CCC
1	1	3	3				1.6			4	0.6	7440382	Arsenic III[4]	339.8	147.9	10	230				180	370	66	135	Tier I	CCC
4	4						42			4	0.6	7440393	Barium	3604.33	1263.19						1500	3100	548	1133	Tier II	CCC
4	4	3	3				0.022			4	0.6	7440417	Beryllium[4]	267.78	29.73	40	300				37	74	14	27	Tier II	CCC
1	1	3	3				0.025			2	0.6	7440439	Cadmium[4]	12.55	4.67	14	1400				7.7	13	2.8	4.8	Tier I	CCC
1	1	3	3				1			4	0.6	16065831	Chromium (III)	1289	168	410000	43000000				241.25	483.99	88.18	176.91	Tier I	CCC
1	1	3	3				0			4	0.6	18540299	Chromium (VI)	15.73	10.56	230	25000				14	27	5.1	9.9	Tier I	CCC
												7440473	Total Chromium								260	510	93	187	Tier I	CCC
4	4	5	5				0.32			4	0.6	7440484	Cobalt	120	19	140	11000				23	47	8.4	17	Tier II	CCC
1	1	3	3				2.8			2	0.6	7440508	Copper	34.38	20.99	280	56000				30	52	11	19	Tier I	CCC
3	3						1.6			4	0.6	7439921	Lead[4]	281.22	14.75						28	55	10	20	Tier I	CCC
4	4	5	5				107			4	0.6	7439965	Manganese	2732	1270	3900	320000				1500	3100	548	1133	Tier II	CCC
1	1	1	1			1		Y		1	0.6	7439976	Mercury[6]	1.440	0.772	0.0018	0.0018			0.0013	0.0013	0.0032	0.00048	0.0012	Tier I	WC
4	4	5	5				1			4	0.6	7439987	Molybdenum	1200	800	130	10000				990	2000	362	731	Tier II	CCC
1	1	3	3				2.6			4	0.6	7440020	Nickel	1088.32	120.88	460	42000				150	300	55	110	Tier I	CCC
	1	3	3				1.1			4	0.6	7782492	Selenium		4.61	140	3400				5.7	12	2.1	4.4	Tier I	CCC
3	4	3	3				0.014			2	0.6	7440224	Silver	0.46	0.058	130	26000				0.076	0.13	0.028	0.048	Tier II	CCC
4	4	3	3				0.013			4	0.6	7440280	Thallium	54	6	2	5				7.4	15	2.7	5.5	Tier II	CCC
5	5						5			4	0.6	7440315	Tin	1300	140						170	340	62	124	EASV[7	CCC
5	5						12			4	0.6	7440326	Titanium	23000	2500						3100	6200	1133	2266	EASV[7	CCC
4	4	3	3				3.1			4	0.6	7440622	Vanadium	110	12	230	2300				14	27	5.1	9.9	Tier II	CCC
1	1	3	3				9.1			4	0.6	7440666	Zinc	272.72	274.95	9000	250000				270	550	99	201	Tier I	CMC
4	4	3	3				0			4	0.6	100414	Ethylbenzene	1000	110	2100	9100				140	270	51	99	Tier II	CCC
4	4	3	3				0.057			4	0.6	91203	Naphthalene	200	26	490	1900				32	65	12	24	Tier II	CCC
3	4	4	4				3			4	0.6	108952	Phenol	1300	180	2000	2300				220	450	80	164	Tier II	CCC
4	4	3	3	3	3		0		Y	4	0.6	127184	Tetrachloroethylene[4]	480	60	320	1700	11	60		74	150	27	55	Tier II	CCC
4	4	1	1				0			4	0.6	108883	Toluene	840	94	5600	51000				120	230	44	84	Tier II	CCC

4	4						0			4	0.6	71556	1,1,1-Trichloroethane	3700	410						510	1000	186	366	Tier II	CCC
												7664417	Total Ammonia (as N)													
1	1						110			4	0.6		Summer	5572.36	1270.05						1500	3100	548	1133	Tier I	CCC
1	1						200			4	0.6		Winter	5919.24	1349.12						1600	3200	585	1170	Tier I	CCC
4	4	5	5				34			4	0.6	7440428	Boron	10000	1600	2500	200000				2000	3900	731	1426	Tier II	CCC
1	1	1					66000			4	0.6	1688706	Chloride	860000	230000	250000					257000	516000	93941	188613	Tier I	CCC
1	1						0			2	0.6	57125	Cyanide, Free	22	5.2						7.5	13	2.7	4.8	Tier I	CCC
		1	1				2.5			4	0.6	57125	Cyanide, Total			600	48000				116000	281000	42401	102714	Tier I	HNC-N
4	4						460			4	0.6	16984488	Fluoride	12000	3400						4000	8100	1462	2961	Tier II	CCC
5	5	1					66000			4	0.6	14808798	Sulfate	1000000	1000000	250000					964000	1934000	352369	706932	EASV[7]	CMC
													Whole Effluent Toxicity (WET)													
1													Acute (TUa) without Mixing Zone	1.0								1.0				
	1												Chronic (TUc)		1.0						1.5					
													Additional Criteria for Lake Michigan													
	2						66000			4	0.6	14808798	Sulfate[8]		250000						514000	1032000	187882	377225	Lake M	CCC
	2						460			4	0.6	16984488	Fluoride[8]		1000						1700	3500	621	1279	Lake M	CCC

1 Number of Carcinogenic pollutants present in the effluent

[1] Source of Criteria
1) Indiana numeric water quality criterion; 327 IAC 2-1.5-8(b)(3), Table 8-1; 327 IAC 2-1.5-8(b)(5), Table 8-3; 327 IAC 2-1.5-8(b)(6), Table 8-4; 327 IAC 2-1.5-8(c)(5); and 327 IAC 2-1.5-8(f).
2) Additional Criteria for Lake Michigan, 327 IAC 2-1.5-8(j), Table 8-9. These criteria are not aquatic life criteria, however, since they are treated as 4-day average criteria, they are included in the chronic aquatic criteria column.
3) Tier I criterion calculated using the methodology in 327 IAC 2-1.5-11, 327 IAC 2-1.5-14, and 327 IAC 2-1.5-15.
4) Tier II value calculated using the methodology in 327 IAC 2-1.5-12, 327 IAC 2-1.5-14, and 327 IAC 2-1.5-15.
5) Estimated ambient screening value (EASV) calculated in accordance with 327 IAC 5-2-11.5(b)(3)(A)(i).

[2] The aquatic criteria for the metals are dissolved criteria. The human health criteria for the metals are total recoverable. The aquatic criteria for cyanide are free cyanide. The human health criteria for cyanide are total cyanide.

[3] The WQBELs for the metals are total recoverable (with the exception of Chromium (VI) which is dissolved).

[4] The above-noted substances are probable or known human carcinogens. If an effluent contains more than one of these substances, the additivity provisions contained in 327 IAC 5-2-11.4(a)(4)(A) shall be applied. This spreadsheet automatically applies these additivity provisions by reducing each human health wasteload allocation for a carcinogen by an equal amount. This allocation between carcinogens can be altered on a case-specific basis.

[5] The above-noted substance is a chlorinated dibenzo-p-dioxin. If an effluent contains more than one chlorinated dibenzo-p-dioxin or chlorinated dibenzofuran, the additivity provisions contained in 327 IAC 5-2-11.4(a)(4)(C) shall be applied.

[6] The above-noted substances are bioaccumulative chemicals of concern (BCCs). Dilution is not allowed for new discharges of BCCs to streams and for any discharges of BCCs to the open waters of Lake Michigan. Dilution is not allowed for existing discharges of BCCs to streams after January 1, 2004 unless the discharge meets an exception. To not allow for dilution for BCCs, place a "Y" in the "BCC" column.

[7] Limits based on estimated ambient screening values (as indicated by EASV) ARE NOT to be used as water quality-based effluent limitations. These are solely to be used as preliminary effluent limitations.

[8] The preliminary effluent limitations calculated using the additional criteria for Lake Michigan were calculated using 100% of the Q7,10 flow.

Last revised: 10 February 2009

ATTACHMENT 17
U.S. Steel - Midwest Plant Data From Form 2C

Parameter	Intake (mg/l)	Outfall 002 (mg/l)	Outfall 003 (mg/l)	Outfall 104 (mg/l)	Outfall 004 (mg/l)
Aluminum	0.064	0.065	0.12	0.054	<0.03
Ammonia-N	<0.05	<0.05	<0.05	<0.05	<0.05
Antimony	<0.03	-	-	<0.03	<0.03
Arsenic	<0.01	-	-	<0.01	<0.01
Barium	0.018	0.02	0.02	<0.01	<0.01
Beryllium	<0.005	-	-	<0.005	<0.005
Boron	0.029	0.022	0.22	0.032	0.03
Cadmium	<0.005	-	-	<0.005	<0.005
Chloride	-	-	-	-	-
Total Residual Chlorine	<0.02	0.05	<0.05	0.05	0.05
Total Chromium	<0.01	-	-	0.14	<0.01
Hexavalent Chromium	-	-	-	-	-
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	-	-	<0.01	<0.01
Free Cyanide	-	-	-	-	-
Total Cyanide	<0.005	-	-	0.042	<0.02
Fluoride	<0.1	0.16	0.15	0.86	0.93
Iron	0.22	0.14	0.23	2.5	0.36
Lead	<0.02	-	-	0.122	<0.02
Manganese	<0.01	0.017	0.018	0.16	0.1
Mercury	-	-	-	-	-
Molybdenum	<0.01	<0.01	<0.01	0.01	<0.01
Nickel	<0.01	-	-	<0.01	<0.01
Selenium	<0.005	-	-	<0.005	<0.005
Silver	<0.01	-	-	<0.01	<0.01
Sulfate	20.4	21	23	295.8	89
Thallium	<0.04	-	-	<0.004	<0.04
Tin	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.011	-	-	0.089	<0.01
Bis(2-ethylhexyl)phthalate	<0.01	-	-	<0.01	<0.01
Ethylbenzene	<0.005	-	-	<0.005	<0.005
Naphthalene	<0.01	-	-	<0.01	<0.01
Phenol	<0.01	-	-	<0.01	<0.01
Total Phenols	<0.004	-	-	<0.011	<0.004
Tetrachloroethylene	<0.005	-	-	<0.005	<0.005
Toluene	<0.005	-	-	<0.005	<0.005
1,1,1-Trichloroethane	<0.005	-	-	<0.005	<0.005

ATTACHMENT 18 - A
U.S. Steel - Midwest Plant Data From Additional Sampling in September 2001

Parameter	Intake (mg/l)	Outfall 002 (mg/l)	Outfall 003 (mg/l)	Outfall 004 (mg/l)
Aluminum	-	-	-	-
Ammonia-N	0.072	0.15	0.082	0.061
Antimony	<0.0019	<0.0019	<0.0019	<0.0019
Arsenic	<0.0024	<0.0024	<0.0024	<0.0024
Barium	-	-	-	-
Beryllium	-	-	-	-
Boron	-	-	-	-
Cadmium	-	-	-	-
Chloride	12	12	11	55
Total Residual Chlorine	<0.1	<0.1	<0.1	<0.1
Total Chromium	<0.0029	<0.0029	<0.0029	0.23
Hexavalent Chromium	-	-	-	-
Cobalt	<0.002	<0.002	<0.002	<0.002
Copper	-	-	-	-
Free Cyanide	0.06	0.09	0.011	<0.002
Total Cyanide	<0.002	<0.002	<0.002	<0.002
Fluoride	0.12	0.18	0.12	0.32
Iron	0.058	0.033	0.48	2
Lead	-	-	-	-
Manganese	-	-	-	-
Mercury	-	-	-	-
Molybdenum	-	-	-	-
Nickel	<0.0058	<0.0058	<0.0058	0.13
Selenium	<0.003	<0.003	<0.003	<0.003
Silver	<0.0023	<0.0023	<0.0023	<0.0023
Sulfate	-	-	-	-
Thallium	<0.00062	<0.00062	<0.00062	<0.00062
Tin	-	-	-	-
Titanium	<0.02	<0.02	<0.02	<0.02
Zinc	<0.0027	0.007	<0.0027	0.075
Bis(2-ethylhexyl)phthalate	-	-	-	-
Ethylbenzene	-	-	-	<0.005
Naphthalene	-	-	-	<0.01
Phenol	-	-	-	<0.01
Total Phenols	<0.005	<0.005	<0.005	<0.005
Tetrachloroethylene	-	-	-	<0.005
Toluene	-	-	-	<0.005
1,1,1-Trichloroethane	-	-	-	<0.005

ATTACHMENT 18 - B
U.S. Steel - Midwest Plant Data From Additional Sampling in 2010

	Total Recoverable Copper			Dissolved Copper		
Date	Intake (mg/l)	Outfall 002 (mg/l)	Outfall 003 (mg/l)	Intake (mg/l)	Outfall 002 (mg/l)	Outfall 003 (mg/l)
4/15/2010	0.0023	0.0041	0.0028	0.0015	0.0033	0.0020
4/20/2010	0.00086	0.0018	0.0024	0.00072	0.0014	0.0021
4/27/2010	0.0019	0.0022	0.0024	0.0017	0.0017	0.0032
5/4/2010	0.0015	0.0011	0.0020	0.00084	0.00076	0.0015
5/11/2010	0.00070	0.0028	0.0023	0.00053	0.0024	0.0019
5/18/2010	0.00098	0.0014	0.0021	0.00073	0.0010	0.0018

LOD = 0.00031 mg/l
LOQ = 0.0020 mg/l

	Total Recoverable Lead			Dissolved Lead		
Date	Intake (mg/l)	Outfall 002 (mg/l)	Outfall 003 (mg/l)	Intake (mg/l)	Outfall 002 (mg/l)	Outfall 003 (mg/l)
4/15/2010	0.0014	0.00029	0.00031	<0.00025	<0.00025	<0.00025
4/20/2010	0.00072	<0.00025	<0.00025	<0.00025	<0.00025	<0.00025
4/27/2010	0.00077	0.00028	<0.00025	<0.00025	<0.00025	<0.00025
5/4/2010	0.0017	<0.00025	<0.00025	<0.00025	<0.00025	<0.00025
5/11/2010	0.00025	0.00025	<0.00025	<0.00025	<0.00025	<0.00025
5/18/2010	0.00031	<0.00025	<0.00025	<0.00025	<0.00025	<0.00025

LOD = 0.00025 mg/l
LOQ = 0.00050 mg/l

ATTACHMENT 19

U.S. Steel - Midwest Plant Data From Additional Sampling for Internal Outfall 104*

Parameter	3/5/2008 (mg/l)	3/12/2008 (mg/l)	3/27/2008 (mg/l)	4/23/2008 (mg/l)
Iron, Dissolved	0.033	0.04	<0.0022	<0.0084
Cadmium, Total	<0.000055	<0.000055	<0.000055	<0.00023
Cadmium, Dissolved	<0.000055	0.000057 J	<0.000055	<0.00023
Chromium, Total	0.015	0.031	0.034	0.039
Chromium, Dissolved	<0.0001	0.00014 J	<0.0001	<0.00049
Copper, Total	0.0017	0.0044	0.00082 J	0.0016 J
Copper, Dissolved	0.0004 J	0.00029 J	0.00047 J	<0.00061
Lead, Total	0.00022 J	0.00027 J	0.00039 J	<0.00006
Lead, Dissolved	<0.00021	0.00031 J	<0.00021	<0.00006
Mercury, Total	0.000000274 J	0.000000268 J	0.000000231 J	not sampled
Nickel, Total	0.0054	0.005	0.0032	0.0052 J
Nickel, Dissolved	0.0047	0.0041	0.0035	0.0038 J
Selenium, Total	0.00041 J	<0.00019	0.00031 J	<0.00012
Selenium, Dissolved	<0.00019	<0.00019	0.00048 J	<0.00012
Silver, Total	<0.00005	<0.00005	<0.00005	<0.00055
Silver, Dissolved	<0.00005	<0.00005	<0.00005	<0.00055
Zinc, Total	0.0062	0.0083	0.0086	0.0089
Zinc, Dissolved	0.0034 J	0.002 J	0.0034 J	<0.0027
Tetrachloroethylene	<0.00024	<0.00024	<0.00024	<0.00024
Naphthalene	<0.00011	<0.00011	<0.0001	<0.00011
Chloride	140	120	110	120
Fluoride	0.42	0.65	0.45	0.64
Sulfate as SO4	260	270	230	190
Sulfide	<1.3	<1.3	<1.3	<1.3
Free Cyanide (WAD)	<0.0019	0.0019 J	<0.0019	0.0025
Cyanide, Total	<0.0022	<0.0022	<0.0022	<0.0022
Chromium, Hexavalent	<0.0005	<0.0005	<0.0005	0.00054

* Results were reported to the limit of detection (LOD). Sample results denoted with a "J" were between the LOD and the limit of quantitation (LOQ).

ATTACHMENT 20 - A
U.S. Steel - Midwest Plant Data From Additional Sampling for Outfall 004*

Parameter	3/5/2008 (mg/l)	3/12/2008 (mg/l)	3/27/2008 (mg/l)	4/23/2008 (mg/l)
Iron, Dissolved	0.024 J	0.019 J	<0.0022	<0.0084
Cadmium, Total	<0.000055	<0.000055	<0.000055	<0.00023
Cadmium, Dissolved	<0.000055	<0.000055	0.000072 J	<0.00023
Chromium, Total	0.0091	0.0079	0.01	0.012
Chromium, Dissolved	<0.0001	<0.0001	0.0002 J	0.00063 J
Copper, Total	0.0017	0.0017	0.00081 J	<0.00061
Copper, Dissolved	0.00067 J	0.00048 J	0.00053 J	<0.00061
Lead, Total	0.00026 J	<0.00021	0.00026 J	<0.00006
Lead, Dissolved	<0.00021	<0.00021	<0.00021	<0.00006
Mercury, Total	0.000000571	0.000000563	0.000000603	not sampled
Nickel, Total	0.0032	0.0029	0.0021	0.004 J
Nickel, Dissolved	0.0026	0.0025	0.0028	0.0018 J
Selenium, Total	0.00038 J	<0.00019	0.00023	<0.00012
Selenium, Dissolved	<0.00019	<0.00019	0.00036	0.00018 J
Silver, Total	<0.00005	<0.00005	<0.00005	<0.00055
Silver, Dissolved	<0.00005	<0.00005	<0.00005	<0.00055
Zinc, Total	0.0063	0.007	0.0053	0.0045 J
Zinc, Dissolved	0.0057	0.0047 J	0.003 J	<0.0027
Tetrachloroethylene	<0.00024	<0.00024	<0.00024	<0.00024
Naphthalene	<0.0001	<0.0001	<0.00011	<0.0001
Chloride	86	86	74	89
Fluoride	0.37	0.48	0.38	0.5
Sulfate as SO4	140	150	140	110
Sulfide	<1.3	<1.3	<1.3	<1.3
Free Cyanide (WAD)	<0.0019	0.0033 J	<0.0019	0.0026
Cyanide, Total	<0.0022	<0.0022	<0.0022	<0.0022
Chromium, Hexavalent	<0.0005	<0.0005	0.00086	<0.0005

* Results were reported to the limit of detection (LOD). Sample results denoted with a "J" were between the LOD and the limit of quantitation (LOQ).

ATTACHMENT 20 - B
U.S. Steel - Midwest Plant Data From Additional Sampling for Outfall 004

	Total Mercury (ng/l)			
Date	**Sample**	**Duplicate**	**Daily**	**Monthly Average**
3/5/2008	0.57	--	0.57	0.58
3/12/2008	0.56	--	0.56	
3/27/2008	0.60	--	0.60	
6/23/2009	<0.14	<0.14	0.14	0.33
6/30/2009	0.52	--	0.52	
7/23/2009	0.19	0.18	0.19	0.24
7/29/2009	0.28	--	0.28	
8/11/2009	0.41	0.44	0.43	0.29
8/24/2009	0.14	--	0.14	
9/3/2009	0.29	0.34	0.32	0.35
9/22/2009	0.37	--	0.37	
10/7/2009	0.21	0.20	0.21	0.22
10/21/2009	0.22	--	0.22	
11/4/2009	0.58	0.48	0.53	0.38
11/22/2009	0.22	--	0.22	
12/2/2009	0.19	0.23	0.21	0.22
12/17/2009	0.23	--	0.23	
1/14/2010	0.23	0.25	0.24	0.21
1/26/2010	0.17	--	0.17	
2/4/2010	0.17	0.18	0.18	0.18
2/18/2010	0.17	--	0.17	
3/4/2010	0.40	0.26	0.33	
Reasonable		**n**	**22**	**10**
Potential		**CV**	**0.5**	**0.4**
Analysis		**max**	**0.60**	**0.58**

ATTACHMENT 21
U.S. Steel - Midwest Plant Internal Outfall 104 Data

Date	Chloride (mg/l) Daily	Chloride (mg/l) Adjusted Daily	Chloride (mg/l) Monthly Average	Hexavalent Chromium (mg/l) Daily	Hexavalent Chromium (mg/l) Adjusted Daily	Hexavalent Chromium (mg/l) Monthly Average
Oct-05	75	75	98	<0.01	0.01	0.010
	52	52		<0.01	0.01	
	158	158		<0.01	0.01	
	95	95		<0.01	0.01	
	109	109				
Nov-05	111	111	87	<0.01	0.01	0.010
	80	80		<0.01	0.01	
	81	81		<0.01	0.01	
	76	76		<0.01	0.01	
Dec-05	90	90	79	<0.01	0.01	0.010
	78	78		<0.01	0.01	
	80	80		<0.01	0.01	
	68	68		<0.01	0.01	
				<0.01	0.01	
Jan-06	88	88	92	<0.01	0.01	0.010
	115	115		<0.01	0.01	
	68	68		<0.01	0.01	
	107	107		<0.01	0.01	
	81	81				
Feb-06	80	80	83	<0.01	0.01	0.010
	82	82		<0.01	0.01	
	86	86		<0.01	0.01	
	84	84		<0.01	0.01	
Mar-06	94	94	83	<0.01	0.01	0.010
	70	70		<0.01	0.01	
	78	78		<0.01	0.01	
	90	90		<0.01	0.01	
				<0.01	0.01	
Apr-06	118	118	121	<0.01	0.01	0.010
	134	134		<0.01	0.01	
	112	112		<0.01	0.01	
	121	121		<0.01	0.01	
May-06	110	110	111	<0.01	0.01	0.010
	93	93		<0.01	0.01	
	107	107		<0.01	0.01	
	124	124		<0.01	0.01	
	119	119				
Jun-06	116	116	101	<0.01	0.01	0.010
	114	114		<0.01	0.01	
	72	72		<0.01	0.01	
	100	100		<0.01	0.01	
				<0.01	0.01	
Jul-06	91	91	96	<0.01	0.01	0.010
	103	103		<0.01	0.01	

Date	Chloride (mg/l) Daily	Chloride (mg/l) Adjusted Daily	Chloride (mg/l) Monthly Average	Hexavalent Chromium (mg/l) Daily	Hexavalent Chromium (mg/l) Adjusted Daily	Hexavalent Chromium (mg/l) Monthly Average
	96	96		<0.01	0.01	
	101	101		<0.01	0.01	
	90	90				
Aug-06	60	60	85	<0.01	0.01	0.010
	70	70		<0.01	0.01	
	112	112		<0.01	0.01	
	97	97		<0.01	0.01	
Sep-06	84	84	89	<0.01	0.01	0.010
	84	84		<0.01	0.01	
	94	94		<0.01	0.01	
	94	94		<0.01	0.01	
				<0.01	0.01	
Oct-06	99	99	94	<0.01	0.01	0.010
	63	63		<0.01	0.01	
	114	114		<0.01	0.01	
	86	86		<0.01	0.01	
	108	108				
Nov-06	93	93	104	<0.01	0.01	0.010
	117	117		<0.01	0.01	
	110	110		<0.01	0.01	
	97	97		<0.01	0.01	
Dec-06	88	88	103	<0.01	0.01	0.010
	94	94		<0.01	0.01	
	123	123		<0.01	0.01	
	105	105		<0.01	0.01	
				<0.01	0.01	
Jan-07	118	118	126	<0.01	0.01	0.010
	142	142		<0.01	0.01	
	112	112		<0.01	0.01	
	124	124		<0.01	0.01	
	135	135				
Feb-07	147	147	108	<0.01	0.01	0.010
	100	100		<0.01	0.01	
	105	105		<0.01	0.01	
	80	80		<0.01	0.01	
Mar-07	116	116	117	<0.01	0.01	0.010
	126	126		<0.01	0.01	
	99	99		<0.01	0.01	
	126	126		<0.01	0.01	
				<0.01	0.01	
Apr-07	118	118	118	<0.01	0.01	0.010
	114	114		<0.01	0.01	
	101	101		<0.01	0.01	
	85	85		<0.01	0.01	
	170	170				
May-07	93	93	99	<0.01	0.01	0.010
	100	100		<0.01	0.01	
	101	101		<0.01	0.01	

	Chloride (mg/l)			Hexavalent Chromium (mg/l)		
Date	Daily	Adjusted Daily	Monthly Average	Daily	Adjusted Daily	Monthly Average
	100	100		<0.01	0.01	
Jun-07	125	125	112	<0.01	0.01	0.010
	105	105		<0.01	0.01	
	114	114		<0.01	0.01	
	104	104		<0.01	0.01	
				<0.01	0.01	
Jul-07	123	123	132	<0.01	0.01	0.010
	110	110		<0.01	0.01	
	169	169		<0.01	0.01	
	129	129		<0.01	0.01	
	131	131				
Aug-07	86	86	119	<0.01	0.01	0.010
	170	170		<0.01	0.01	
	128	128		<0.01	0.01	
	92	92		<0.01	0.01	
				<0.01	0.01	
Sep-07	122	122	112	<0.01	0.01	0.010
	141	141		<0.01	0.01	
	96	96		<0.01	0.01	
	88	88		<0.01	0.01	
Oct-07	87	87	98	<0.01	0.01	0.010
	124	124		<0.01	0.01	
	88	88		<0.01	0.01	
	77	77		<0.01	0.01	
	116	116				
Nov-07	101	101	90	<0.01	0.01	0.010
	79	79		<0.01	0.01	
	76	76		<0.01	0.01	
	105	105		<0.01	0.01	
				<0.01	0.01	
Dec-07	123	123	105	<0.01	0.01	0.010
	84	84		<0.01	0.01	
	108	108		<0.01	0.01	
	120	120		<0.01	0.01	
	90	90				
Jan-08	113	113	123	<0.01	0.01	0.010
	115	115		<0.01	0.01	
	97	97		<0.01	0.01	
	165	165		<0.01	0.01	
Feb-08	103	103	124	<0.01	0.01	0.010
	175	175		<0.01	0.01	
	128	128		<0.01	0.01	
	90	90		<0.01	0.01	
				<0.01	0.01	
Mar-08	95	95	110	<0.01	0.01	0.010
	102	102		<0.01	0.01	
	94	94		<0.01	0.01	
	104	104		<0.01	0.01	

Date	Chloride (mg/l) Daily	Chloride (mg/l) Adjusted Daily	Chloride (mg/l) Monthly Average	Hexavalent Chromium (mg/l) Daily	Hexavalent Chromium (mg/l) Adjusted Daily	Hexavalent Chromium (mg/l) Monthly Average
	156	156				
Apr-08	113	113	131	<0.01	0.01	0.010
	133	133		<0.01	0.01	
	166	166		<0.01	0.01	
	110	110		<0.01	0.01	
May-08	183	183	166	<0.01	0.01	0.010
	188	188		<0.01	0.01	
	168	168		<0.01	0.01	
	125	125		<0.01	0.01	
				<0.01	0.01	
Jun-08	113	113	141	<0.01	0.01	0.010
	169	169		<0.01	0.01	
	130	130		<0.01	0.01	
	114	114		<0.01	0.01	
	178	178				
Jul-08	140	140	129	<0.01	0.01	0.010
	130	130		<0.01	0.01	
	150	150		<0.01	0.01	
	94	94		<0.01	0.01	
Aug-08	108	108	105	<0.01	0.01	0.010
	69	69		<0.01	0.01	
	99	99		<0.01	0.01	
	144	144		<0.01	0.01	
				<0.01	0.01	
Sep-08	130	130	116	<0.01	0.01	0.010
	130	130		<0.01	0.01	
	93	93		<0.01	0.01	
	135	135		<0.01	0.01	
	94	94				
Outlier Analysis	**mean**	**108.6**		**mean**	**0.010**	
	std	**26.7**		**std**	**0.000**	
	mean + 3std	**188.7**		**mean + 3std**	**0.010**	
Reasonable Potential Analysis	**n**	**157**	**36**	**n**	**156**	**36**
	CV	**0.2**	**0.2**	**CV**	**0.0**	**0.0**
	max	**188**	**166**	**max**	**0.01**	**0.01**

ATTACHMENT 22
U.S. Steel - Midwest Plant Internal Outfall 104 Data

	Fluoride (mg/l)			Net Sulfate (mg/l)		
Date	Daily	Adjusted Daily	Monthly Average	Daily	Adjusted Daily	Monthly Average
Oct-05	0.19	0.19	0.23	180	180	150
	0.25	0.25		134	134	
	0.25	0.25		169	169	
	0.25	0.25		118	118	
	0.2	0.2				
Nov-05	0.21	0.21	0.24	209	209	215
	0.25	0.25		242	242	
	0.25	0.25		212	212	
	0.25	0.25		198	198	
Dec-05	0.2	0.2	0.22	174	174	266
	0.25	0.25		331	331	
	0.25	0.25		256	256	
	0.17	0.17		251	251	
				319	319	
Jan-06	0.25	0.25	0.23	241	241	261
	0.21	0.21		243	243	
	0.2	0.2		306	306	
	0.25	0.25		255	255	
	0.22	0.22				
Feb-06	0.25	0.25	0.25	201	201	187
	0.25	0.25		194	194	
	0.25	0.25		171	171	
	0.25	0.25		182	182	
Mar-06	0.19	0.19	0.24	203	203	177
	0.25	0.25		153	153	
	0.25	0.25		178	178	
	0.25	0.25		168	168	
				184	184	
Apr-06	0.25	0.25	0.31	229	229	203
	0.25	0.25		203	203	
	0.25	0.25		207	207	
	0.47	0.47		172	172	
May-06	0.21	0.21	0.24	142	142	153
	0.25	0.25		180	180	
	0.25	0.25		147	147	
	0.25	0.25		141	141	
	0.25	0.25				
Jun-06	0.21	0.21	0.27	163	163	183
	0.35	0.35		159	159	
	0.25	0.25		201	201	
	0.25	0.25		198	198	
				193	193	
Jul-06	0.25	0.25	0.28	195	195	211
	0.25	0.25		255	255	

	Fluoride (mg/l)			Net Sulfate (mg/l)		
Date	Daily	Adjusted Daily	Monthly Average	Daily	Adjusted Daily	Monthly Average
	0.39	0.39		188	188	
	0.31	0.31		204	204	
	0.18	0.18				
Aug-06	0.25	0.25	0.24	189	189	192
	0.25	0.25		151	151	
	0.25	0.25		204	204	
	0.22	0.22		218	218	
				198	198	
Sep-06	0.19	0.19	0.21	226	226	208
	0.18	0.18		233	233	
	0.21	0.21		194	194	
	0.25	0.25		179	179	
Oct-06	0.19	0.19	0.22	158	158	192
	0.16	0.16		169	169	
	0.25	0.25		219	219	
	0.25	0.25		220	220	
	0.25	0.25				
Nov-06	0.22	0.22	0.25	266	266	248
	0.25	0.25		257	257	
	0.3	0.3		264	264	
	0.24	0.24		250	250	
				201	201	
Dec-06	0.25	0.25	0.22	220	220	238
	0.21	0.21		281	281	
	0.24	0.24		231	231	
	0.19	0.19		220	220	
Jan-07	0.21	0.21	0.23	198	198	220
	0.25	0.25		225	225	
	0.22	0.22		227	227	
	0.24	0.24		228	228	
	0.24	0.24				
Feb-07	0.24	0.24	0.24	192	192	209
	0.25	0.25		244	244	
	0.25	0.25		203	203	
	0.22	0.22		198	198	
Mar-07	0.25	0.25	0.25	198	198	236
	0.26	0.26		252	252	
	0.25	0.25		243	243	
	0.23	0.23		301	301	
				188	188	
Apr-07	0.2	0.2	0.22	205	205	231
	0.21	0.21		318	318	
	0.25	0.25		213	213	
	0.25	0.25		187	187	
	0.2	0.2				
May-07	0.25	0.25	0.25	233	233	211
	0.25	0.25		246	246	
	0.25	0.25		216	216	

Date	Fluoride (mg/l) Daily	Fluoride (mg/l) Adjusted Daily	Fluoride (mg/l) Monthly Average	Net Sulfate (mg/l) Daily	Net Sulfate (mg/l) Adjusted Daily	Net Sulfate (mg/l) Monthly Average
	0.25	0.25		156	156	
				206	206	
Jun-07	0.25	0.25	0.25	177	177	197
	0.25	0.25		194	194	
	0.25	0.25		213	213	
	0.25	0.25		202	202	
Jul-07	0.25	0.25	0.27	144	144	158
	0.25	0.25		149	149	
	0.37	0.37		174	174	
	0.25	0.25		164	164	
	0.25	0.25				
Aug-07	0.25	0.25	0.25	214	214	247
	0.25	0.25		329	329	
	0.25	0.25		204	204	
	0.25	0.25		264	264	
				222	222	
Sep-07	0.25	0.25	0.25	162	162	161
	0.25	0.25		184	184	
	0.25	0.25		145	145	
	0.25	0.25		153	153	
Oct-07	0.25	0.25	0.25	236	236	239
	0.25	0.25		277	277	
	0.25	0.25		207	207	
	0.25	0.25		235	235	
	0.27	0.27				
Nov-07	0.25	0.25	0.25	190	190	224
	0.25	0.25		182	182	
	0.25	0.25		216	216	
	0.25	0.25		265	265	
				267	267	
Dec-07	0.27	0.27	0.25	217	217	238
	0.25	0.25		262	262	
	0.25	0.25		224	224	
	0.21	0.21		247	247	
	0.25	0.25				
Jan-08	0.25	0.25	0.25	230	230	209
	0.25	0.25		218	218	
	0.25	0.25		205	205	
	0.25	0.25		196	196	
				196	196	
Feb-08	0.25	0.25	0.29	271	271	239
	0.41	0.41		267	267	
	0.25	0.25		191	191	
	0.25	0.25		225	225	
Mar-08	0.25	0.25	0.25	216	216	215
	0.25	0.25		275	275	
	0.25	0.25		192	192	
	0.25	0.25		178	178	

Date	Fluoride (mg/l) Daily	Fluoride (mg/l) Adjusted Daily	Fluoride (mg/l) Monthly Average	Net Sulfate (mg/l) Daily	Net Sulfate (mg/l) Adjusted Daily	Net Sulfate (mg/l) Monthly Average
	0.25	0.25				
Apr-08	0.25	0.25	0.26	170	170	154
	0.25	0.25		174	174	
	0.26	0.26		133	133	
	0.26	0.26		140	140	
May-08	0.25	0.25	0.25	199	199	178
	0.25	0.25		211	211	
	0.25	0.25		170	170	
	0.25	0.25		163	163	
				147	147	
Jun-08	0.25	0.25	0.28	146	146	174
	0.25	0.25		169	169	
	0.25	0.25		187	187	
	0.25	0.25		193	193	
	0.38	0.38				
Jul-08	0.25	0.25	0.30	157	157	164
	0.25	0.25		176	176	
	0.3	0.3		202	202	
	0.4	0.4		143	143	
				140	140	
Aug-08	0.25	0.25	0.25	156	156	150
	0.25	0.25		156	156	
	0.25	0.25		147	147	
	0.25	0.25		139	139	
Sep-08	0.25	0.25	0.25	247	247	222
	0.26	0.26		240	240	
	0.26	0.26		195	195	
	0.25	0.25		204	204	
	0.25	0.25				
Outlier Analysis	**mean**	**0.249**		**mean**	**204.9**	
	std	**0.039**		**std**	**42.6**	
	mean + 3std	**0.367**		**mean + 3std**	**332.7**	
Reasonable Potential Analysis	**n**	**157**	**36**	**n**	**156**	**36**
	CV	**0.2**	**0.1**	**CV**	**0.2**	**0.2**
	max	**0.47**	**0.31**	**max**	**331**	**266**

ATTACHMENT 23
U.S. Steel - Midwest Plant Internal Outfall 104 Data

	Total Lead (mg/l)		Naphthalene (mg/l)		Tetrachloroethylene (mg/l)	
Date	Daily	Adjusted Daily	Daily	Adjusted Daily	Daily	Adjusted Daily
Oct-05	<0.03	0.03				
Nov-05			<0.01	0.01	<0.005	0.005
Jan-06	<0.03	0.03				
Feb-06			<0.001		<0.0005	
Mar-06	<0.03	0.03				
Apr-06	<0.03	0.03				
May-06			<0.01	0.01	<0.005	0.005
Jul-06	<0.03	0.03				
Aug-06			<0.01	0.01	<0.005	0.005
Oct-06	<0.03	0.03	<0.01	0.01	<0.005	0.005
Jan-07	<0.03	0.03	<0.01	0.01	<0.005	0.005
Apr-07	<0.03	0.03	<0.01	0.01	<0.005	0.005
Jul-07			<0.01	0.01	<0.005	0.005
Oct-07	<0.03	0.03	<0.01	0.01	<0.005	0.005
Jan-08	<0.03	0.03	<0.01	0.01	<0.005	0.005
Feb-08	<0.03	0.03	<0.01	0.01	<0.005	0.005
Jul-08	<0.03	0.03	<0.01	0.01	<0.005	0.005
	mean	**0.030**	**mean**	**0.010**	**mean**	**0.0050**
Outlier Analysis	**std**	**0.000**	**std**	**0.000**	**std**	**0.0000**
	mean + 3std	**0.030**	**mean + 3std**	**0.010**	**mean + 3std**	**0.0050**
Reasonable	**n**	**12**	**n**	**11**	**n**	**11**
Potential	**CV**	**0.0**	**CV**	**0.0**	**CV**	**0.0**
Analysis	**max**	**0.03**	**max**	**0.01**	**max**	**0.005**

ATTACHMENT 24

Reasonable Potential Statistical Procedure for U.S. Steel - Midwest Plant Using Outfall 004 Data

6/8/2010
5:12 PM

(calculated in accordance with 327 IAC 5-2-11.5)		Monthly Average Determination							Daily Maximum Determination						
Parameters	WQBELs Required*	Maximum Monthly Average (ug/l)	Number of Monthly Averages	CV	MF	PEQ (ug/l)	PEL (ug/l)	PEQ > PEL?	Maximum Daily Sample (ug/l)	Number of Daily Samples	CV	MF	PEQ (ug/l)	PEL (ug/l)	PEQ > PEL?
Antimony	No					12	99	No	1.9	1	0.6	6.2	12	200	No
Arsenic III	No					15	180	No	2.4	1	0.6	6.2	15	370	No
Barium	No					62	1500	No	10	1	0.6	6.2	62	3100	No
Beryllium	No					31	37	No	5	1	0.6	6.2	31	74	No
Cadmium	No	0.055	1	0.6	6.2	0.34	7.7	No	0.23	4	0.6	2.6	0.6	13	No
Chromium (VI)	No	0.62	1	0.6	6.2	3.8	14	No	0.86	4	0.6	2.6	2.2	27	No
Total Chromium	No	9	1	0.6	6.2	56	260	No	230	6	0.6	2.1	480	510	No
Cobalt	No					12	23	No	2	1	0.6	6.2	12	47	No
Copper	No	1.4	1	0.6	6.2	8.7	30	No	1.7	4	0.6	2.6	4.4	52	No
Lead	No	0.24	1	0.6	6.2	1.5	28	No	0.26	4	0.6	2.6	0.68	55	No
Manganese	No					620	1500	No	100	1	0.6	6.2	620	3100	No
Mercury	No	0.00058	10	0.4	1.5	0.00087	0.0013	No	0.0006	22	0.5	1.3	0.00078	0.0032	No
Molybdenum	No					62	990	No	10	1	0.6	6.2	62	2000	No
Nickel	No	2.7	1	0.6	6.2	17	150	No	130	6	0.6	2.1	270	300	No
Selenium	No	0.27	1	0.6	6.2	1.7	5.7	No	0.38	4	0.6	2.6	0.99	12	No
Silver	Yes II	0.05	1	0.6	6.2	0.31	0.076	Yes	0.05	3	0.6	3.0	0.15	0.13	Yes
Thallium	No					3.8	7.4	No	0.62	1	0.6	6.2	3.8	15	No
Tin	No					120	170	No	20	1	0.6	6.2	120	340	No
Titanium	No					62	3100	No	10	1	0.6	6.2	62	6200	No
Vanadium															
Zinc	No	6.2	1	0.6	6.2	38	270	No	75	6	0.6	2.1	160	550	No
Ethylbenzene	No					19	140	No	5	2	0.6	3.8	19	270	No
Naphthalene	No	0.1	1	0.6	6.2	0.62	32	No	0.11	4	0.6	2.6	0.29	65	No
Phenol	No					38	220	No	10	2	0.6	3.8	38	450	No
Tetrachloroethylene	No	0.24	1	0.6	6.2	1.5	74	No	0.24	4	0.6	2.6	0.62	150	No
Toluene	No					19	120	No	5	2	0.6	3.8	19	230	No
1,1,1-Trichloroethane	No					19	510	No	5	2	0.6	3.8	19	1000	No
Total Ammonia (as N)															
Summer	No					230	1500	No	61	2	0.6	3.8	230	3100	No
Winter	No					230	1600	No	61	2	0.6	3.8	230	3200	No
Boron	No					190	2000	No	30	1	0.6	6.2	190	3900	No
Chloride	No+	82000	1	0.6	6.2	508000	257000	Yes	89000	5	0.6	2.3	205000	516000	No
Cyanide, Free	Yes I	2.4	1	0.6	6.2	15	7.5	Yes	3.3	4	0.6	2.6	8.6	13	No
Cyanide, Total	No	2.2	1	0.6	6.2	14	116000	No	2.2	4	0.6	2.6	5.7	281000	No
Fluoride															
Sulfate															
Additional Criteria for Lake Michigan															
Sulfate	No+	143000	1	0.6	6.2	887000	514000	Yes	150000	5	0.6	2.3	345000	1032000	No
Fluoride	No+	410	1	0.6	6.2	2500	1700	Yes	930	6	0.6	2.1	2000	3500	No

*WQBELs Required:

[1] "Yes I" means that a projected effluent quality (PEQ) exceeded a preliminary effluent limitation (PEL) based on a Tier I criterion and WQBELs must be included in the NPDES permit.
[2] "Yes II" means that a PEQ exceeded a PEL based on a Tier II value and WQBELs must be included in the NPDES permit.
[3] "No" means that a PEQ did not exceed a PEL and WQBELs do not have to be included in the NPDES permit based on the reasonable potential statistical procedure.
[4] "No+" means that the reasonable potential analysis using internal Outfall 104 data was considered to be more representative and was used to determine whether WQBELs must be included in the NPDES permit based on the reasonable potential statistical procedure.
[5] "Data" means that a PEQ exceeded a PEL based on an "estimated ambient screening value" and the permittee must generate sufficient data to develop a Tier I criterion or Tier II value for the parameter.

ATTACHMENT 25

Reasonable Potential Statistical Procedure for U.S. Steel - Midwest Plant Using Internal Outfall 104 Data

2/27/2009
1:35 PM

(calculated in accordance with 327 IAC 5-2-11.5)		Monthly Average Determination							Daily Maximum Determination						
Parameters	WQBELs Required*	Maximum Monthly Average (ug/l)	Number of Monthly Averages	CV	MF	PEQ (ug/l)	PEL (ug/l)	PEQ > PEL?	Maximum Daily Sample (ug/l)	Number of Daily Samples	CV	MF	PEQ (ug/l)	PEL (ug/l)	PEQ > PEL?
Antimony															
Arsenic III															
Barium															
Beryllium															
Cadmium															
Chromium (VI)	No	10	36	0.0	1.0	10	14	No	10	156	0.0	1.0	10	27	No
Total Chromium	No	35	35	0.0	1.0	35	260	No	59	782	0.1	1.0	59	510	No
Cobalt															
Copper															
Lead	No+					30	28	Yes	30	12	0.0	1.0	30	55	No
Manganese															
Mercury															
Molybdenum															
Nickel															
Selenium															
Silver															
Thallium															
Tin															
Titanium															
Vanadium															
Zinc	No	32	35	0.0	1.0	32	270	No	79	782	0.1	1.0	79	550	No
Ethylbenzene															
Naphthalene	No					10	32	No	10	11	0.0	1.0	10	65	No
Phenol															
Tetrachloroethylene	No					5	74	No	5	11	0.0	1.0	5	150	No
Toluene															
1,1,1-Trichloroethane															
Total Ammonia (as N)															
Summer															
Winter															
Boron															
Chloride	No	166000	36	0.2	1.0	166000	257000	No	188000	157	0.2	1.0	188000	516000	No
Cyanide, Free	Yes I	22	35	0.0	1.0	22	7.5	Yes	50	782	0.1	1.0	50	13	Yes
Cyanide, Total	No	22	35	0.0	1.0	22	116000	No	50	782	0.1	1.0	50	281000	No
Fluoride															
Sulfate															
Additional Criteria for Lake Michigan															
Sulfate	No	290000	36	0.2	1.0	290000	514000	No	357000	156	0.2	1.0	357000	1032000	No
Fluoride	No	310	36	0.1	1.0	310	1700	No	470	157	0.2	1.0	470	3500	No

*WQBELs Required:

[1] "Yes I" means that a projected effluent quality (PEQ) exceeded a preliminary effluent limitation (PEL) based on a Tier I criterion and WQBELs must be included in the NPDES permit.
[2] "Yes II" means that a PEQ exceeded a PEL based on a Tier II value and WQBELs must be included in the NPDES permit.
[3] "No" means that a PEQ did not exceed a PEL and WQBELs do not have to be included in the NPDES permit based on the reasonable potential statistical procedure.
[4] "No+" means that the reasonable potential analysis using Outfall 004 data was considered to be more representative and was used to determine whether WQBELs must be included in the NPDES permit based on the reasonable potential statistical procedure.
[5] "Data" means that a PEQ exceeded a PEL based on an "estimated ambient screening value" and the permittee must generate sufficient data to develop a Tier I criterion or Tier II value for the parameter.

ATTACHMENT 26
U.S. Steel - Midwest Plant Outfall 004
Whole Effluent Toxicity Data

Species: *Ceriodaphnia dubia*

Date	LC50 (%)	Acute (TU_a)	Adjusted Acute (TU_a)	NOEC (%)	Chronic (TU_c)
May-03	>100	<1.0	1.0	69	1.4
Nov-03	>100	<1.0	1.0	34	2.9
May-04	>100	<1.0	1.0	100	1.0
Nov-04	>100	<1.0	1.0	100	1.0
May-05	>100	<1.0	1.0	100	1.0
Nov-05	>100	<1.0	1.0	100	1.0
May-06	>100	<1.0	1.0	100	1.0
Nov-06	>100	<1.0	1.0	100	1.0
May-07	>100	<1.0	1.0	100	1.0
Nov-07	>100	<1.0	1.0	100	1.0
May-08	>100	<1.0	1.0	100	1.0
Nov-08	>100	<1.0	1.0	100	1.0
n			**12**		**12**
CV			**0.0**		**0.5**
Maximum			**1.0**		**2.9**

Species: **Fathead Minnow**

Date	LC50 (%)	Acute (TU_a)	Adjusted Acute (TU_a)	NOEC (%)	Chronic (TU_c)
May-03	>100	<1.0	1.0	100	1.0
Nov-03	>100	<1.0	1.0	100	1.0
May-04	>100	<1.0	1.0	100	1.0
Nov-04	>100	<1.0	1.0	34	2.9
May-05	>100	<1.0	1.0	100	1.0
Nov-05	>100	<1.0	1.0	100	1.0
May-06	>100	<1.0	1.0	69	1.4
Nov-06	>100	<1.0	1.0	17.23	5.8
May-07	>100	<1.0	1.0	17.23	5.8
Nov-07	>100	<1.0	1.0	69	1.4
May-08	>100	<1.0	1.0	69	1.4
Nov-08	>100	<1.0	1.0	100	1.0
n			**12**		**12**
CV			**0.0**		**0.9**
Maximum			**1.0**		**5.8**

ATTACHMENT 27

Antidegradation Procedure for Non-BCCs for U.S. Steel - Midwest Plant Combined Outfalls 002, 003 and 004

2/27/2009
12:39 PM

(calculated in accordance with 327 IAC 5-2-11.3)		Existing Conditions (these data need to be entered)						Proposed Conditions (automatically entered if WQBELs, otherwise limitations must be entered)					Antidegradation Review				
		Existing Effluent Flow =	69.58 mgd														
	High Quality Water?	Existing Effluent Limitations				Existing Effluent Quality (only needed if no limitations)		Proposed Effluent Limitations				Basis of Proposed Limits	New or Increased	Receiving Water	Is the Proposed Increase Greater than De minimis?		Antidegradation Demonstration
		Concentration (μg/l)		Mass (lbs/day)		Conc. (μg/l)	Mass (lbs/day)	Concentration (μg/l)		Mass (lbs/day)		(Technology/			De minimis	De minimis	
Parameters	(Yes/No)	Average	Maximum	Average	Maximum	Average	Average	Average	Maximum	Average	Maximum	WQBELs)	Permit Limit?	Increase?	Test 1*	Test 2*	Required?
Chlorine (total residual)	Yes	20	40					10	20	5.8	12	WQBELs	Yes	No			No

*De minimis Tests:

Test 1: The proposed increase in mass discharged is greater than or equal to 10% of the unused loading capacity.
Test 2: Less than 10% of the total loading capacity remains unused after the lowering of water quality.

ATTACHMENT 28

Antidegradation Procedure for Non-BCCs for U.S. Steel - Midwest Plant Outfall 004

2/27/2009
12:49 PM

(calculated in accordance with 327 IAC 5-2-11.3)		Existing Conditions (these data need to be entered)						Proposed Conditions (automatically entered if WQBELs, otherwise limitations must be entered)					Antidegradation Review				
		Existing Effluent Flow =	43.8	mgd													
	High Quality Water?	Existing Effluent Limitations				Existing Effluent Quality (only needed if no limitations)		Proposed Effluent Limitations				Basis of Proposed Limits	New or Increased	Receiving Water	Is the Proposed Increase Greater than De minimis?		Antidegradation Demonstration
		Concentration (µg/l)		Mass (lbs/day)		Conc. (µg/l)	Mass (lbs/day)	Concentration (µg/l)		Mass (lbs/day)		(Technology/			De minimis	De minimis	
Parameters	(Yes/No)	Average	Maximum	Average	Maximum	Average	Average	Average	Maximum	Average	Maximum	WQBELs)	Permit Limit?	Increase?	Test 1*	Test 2*	Required?
Silver	Yes					0.31	0.11	0.076	0.13	0.028	0.048	WQBELs	Yes	No			No
Cyanide, Free	Yes					15	5.5	7.5	13	2.7	4.8	WQBELs	Yes	No			No

*De minimis Tests:

Test 1: The proposed increase in mass discharged is greater than or equal to 10% of the unused loading capacity.
Test 2: Less than 10% of the total loading capacity remains unused after the lowering of water quality.

ATTACHMENT 29
U.S. Steel - Midwest Plant Outfall 002
Comparison of Available Dilution Factor to Modeled Dilution Factor

Q7,10:	71 mgd
Harmonic Mean:	228 mgd
ERM:	517 mgd
Width of Waterway:	50 m

Date	Effluent Flow (mgd)	Available Dilution Factor						Modeled Transition Distance (m)	Modeled Dilution Factor	
		100% Mixing Zone			50% Mixing Zone					
		Q7,10	Harmonic Mean	ERM	Q7,10	Harmonic Mean	ERM		Stable Centerline	Edge of Mixing Zone
8/1/08										
8/2/08										
8/3/08										
8/4/08										
8/5/08	5.394	14	43	97	7.6	22	49	395	104	109
8/6/08										
8/7/08										
8/8/08										
8/9/08										
8/10/08										
8/11/08										
8/12/08	5.472	14	43	95	7.5	22	48	198	52	55
8/13/08										
8/14/08										
8/15/08										
8/16/08										
8/17/08										
8/18/08										
8/19/08	5.395	14	43	97	7.6	22	49	274	72	76
8/20/08										
8/21/08										
8/22/08										
8/23/08										
8/24/08										
8/25/08										
8/26/08	5.445	14	43	96	7.5	22	48	174	46	48
8/27/08										
8/28/08										
8/29/08										
8/30/08										
8/31/08										

ATTACHMENT 30
U.S. Steel - Midwest Plant Outfall 003
Comparison of Available Dilution Factor to Modeled Dilution Factor

Q7,10:	71 mgd
Harmonic Mean:	228 mgd
ERM:	517 mgd
Width of Waterway:	65 m

		Available Dilution Factor						Modeled	Modeled Dilution Factor	
	Effluent	100% Mixing Zone			50% Mixing Zone			Transition		
	Flow		Harmonic			Harmonic		Distance	Stable	Edge of
Date	(mgd)	Q7,10	Mean	ERM	Q7,10	Mean	ERM	(m)	Centerline	Mixing Zone
8/1/08										
8/2/08										
8/3/08										
8/4/08										
8/5/08	17.387	5.1	14	31	3.0	7.6	16	284	48	96
8/6/08										
8/7/08										
8/8/08										
8/9/08										
8/10/08										
8/11/08										
8/12/08	16.865	5.2	15	32	3.1	7.8	16	321	55	111
8/13/08										
8/14/08										
8/15/08										
8/16/08										
8/17/08										
8/18/08										
8/19/08	16.811	5.2	15	32	3.1	7.8	16	448	77	155
8/20/08										
8/21/08										
8/22/08										
8/23/08										
8/24/08										
8/25/08										
8/26/08	17.068	5.2	14	31	3.1	7.7	16	363	61	123
8/27/08										
8/28/08										
8/29/08										
8/30/08										
8/31/08										

ATTACHMENT 31
U.S. Steel - Midwest Plant Outfall 004
Comparison of Available Dilution Factor to Modeled Dilution Factor

Q7,10:	71 mgd
Harmonic Mean:	228 mgd
ERM:	517 mgd
Width of Waterway:	60 m

Date	Effluent Flow (mgd)	Available Dilution Factor						Modeled Transition Distance (m)	Modeled Dilution Factor	
		100% Mixing Zone			50% Mixing Zone					
		Q7,10	Harmonic Mean	ERM	Q7,10	Harmonic Mean	ERM		Stable Centerline	Edge of Mixing Zone
8/1/08	24.4	3.9	10	22	2.5	5.7	12	182	19	12
8/2/08										
8/3/08										
8/4/08	23.744	4.0	11	23	2.5	5.8	12	155	16	10
8/5/08	21.166	4.4	12	25	2.7	6.4	13	139	15	9.6
8/6/08	19.479	4.6	13	28	2.8	6.9	14	110	12	7.7
8/7/08	20.745	4.4	12	26	2.7	6.5	13	129	14	8.9
8/8/08	31.08	3.3	8.3	18	2.1	4.7	9.3	167	16	10
8/9/08										
8/10/08										
8/11/08	29.108	3.4	8.8	19	2.2	4.9	9.9	154	15	9.5
8/12/08	30.24	3.3	8.5	18	2.2	4.8	9.5	167	16	10
8/13/08	26.82	3.6	9.5	20	2.3	5.3	11	147	15	9.3
8/14/08	52.473	2.4	5.3	11	1.7	3.2	5.9	250	20	12
8/15/08	24.021	4.0	10	23	2.5	5.7	12	145	15	9.4
8/16/08										
8/17/08										
8/18/08	24	4.0	11	23	2.5	5.8	12	154	16	10
8/19/08	32.368	3.2	8.0	17	2.1	4.5	9.0	178	17	11
8/20/08	17.9	5.0	14	30	3.0	7.4	15	140	17	10
8/21/08	25.976	3.7	9.8	21	2.4	5.4	11	154	16	9.9
8/22/08	22.283	4.2	11	24	2.6	6.1	13	149	16	10
8/23/08										
8/24/08										
8/25/08	27.93	3.5	9.2	20	2.3	5.1	10	166	16	10
8/26/08	25.29	3.8	10	21	2.4	5.5	11	150	15	9.6
8/27/08	22.681	4.1	11	24	2.6	6.0	12	143	15	9.5
8/28/08	30.242	3.3	8.5	18	2.2	4.8	9.5	163	16	9.8
8/29/08	28.817	3.5	8.9	19	2.2	5.0	10.0	171	17	11
8/30/08										
8/31/08										

ATTACHMENT 32
U.S. Steel - Midwest Plant Outfall 002
Comparison of Delta T at Edge of Mixing Zone (Set Equal to 50% of Flow) to Modeled Delta T

Q7,10:	71 mgd
Harmonic Mean:	228 mgd
ERM:	517 mgd

Date	Effluent Flow (mgd)	Upstream Temp. °F	Effluent Temp. °F	Delta T at Edge of Mixing Zone Q7,10 °F	Harmonic Mean °F	ERM °F	Modeled °F
8/1/08		78					
8/2/08							
8/3/08							
8/4/08		77					
8/5/08	5.394	73	77	0.5	0.2	0.1	0.0
8/6/08		73					
8/7/08		72					
8/8/08		73					
8/9/08							
8/10/08							
8/11/08		71					
8/12/08	5.472	72	79	0.9	0.3	0.1	0.1
8/13/08		72					
8/14/08		73					
8/15/08		73					
8/16/08							
8/17/08							
8/18/08		75					
8/19/08	5.395	76	78	0.3	0.1	0.0	0.0
8/20/08		76					
8/21/08		74					
8/22/08		75					
8/23/08							
8/24/08							
8/25/08		76					
8/26/08	5.445	74	83	1.2	0.4	0.2	0.2
8/27/08		74					
8/28/08		74					
8/29/08		75					
8/30/08							
8/31/08							

ATTACHMENT 33
U.S. Steel - Midwest Plant Outfall 003
Comparison of Delta T at Edge of Mixing Zone (Set Equal to 50% of Flow) to Modeled Delta T

Q7,10:	71 mgd
Harmonic Mean:	228 mgd
ERM:	517 mgd

Date	Effluent Flow (mgd)	Upstream Temp. °F	Effluent Temp. °F	Delta T at Edge of Mixing Zone Q7,10 °F	Harmonic Mean °F	ERM °F	Modeled °F
8/1/08		78					
8/2/08							
8/3/08							
8/4/08		77					
8/5/08	17.387	73	83	3.3	1.3	0.6	0.1
8/6/08		73					
8/7/08		72					
8/8/08		73					
8/9/08							
8/10/08							
8/11/08		71					
8/12/08	16.865	72	78	1.9	0.8	0.4	0.1
8/13/08		72					
8/14/08		73					
8/15/08		73					
8/16/08							
8/17/08							
8/18/08		75					
8/19/08	16.811	76	81	1.6	0.6	0.3	0.0
8/20/08		76					
8/21/08		74					
8/22/08		75					
8/23/08							
8/24/08							
8/25/08		76					
8/26/08	17.068	74	80	1.9	0.8	0.4	0.0
8/27/08		74					
8/28/08		74					
8/29/08		75					
8/30/08							
8/31/08							

ATTACHMENT 34
U.S. Steel - Midwest Plant Outfall 004
Comparison of Delta T at Edge of Mixing Zone (Set Equal to 50% of Flow) to Modeled Delta T

Q7,10:	71 mgd
Harmonic Mean:	228 mgd
ERM:	517 mgd

Date	Effluent Flow (mgd)	Upstream Temp. °F	Effluent Temp. °F	Delta T at Edge of Mixing Zone Q7,10 °F	Harmonic Mean °F	ERM °F	Modeled °F
8/1/08	24.4	78	91	5.3	2.3	1.1	1.0
8/2/08							
8/3/08							
8/4/08	23.744	77	91	5.6	2.4	1.2	1.2
8/5/08	21.166	73	92	7.1	3.0	1.4	1.8
8/6/08	19.479	73	94	7.4	3.1	1.5	2.4
8/7/08	20.745	72	91	7.0	2.9	1.4	1.9
8/8/08	31.08	73	90	7.9	3.6	1.8	1.5
8/9/08							
8/10/08							
8/11/08	29.108	71	87	7.2	3.3	1.6	1.5
8/12/08	30.24	72	86	6.4	2.9	1.5	1.3
8/13/08	26.82	72	88	6.9	3.0	1.5	1.5
8/14/08	52.473	73	85	7.2	3.8	2.0	0.9
8/15/08	24.021	73	89	6.5	2.8	1.4	1.5
8/16/08							
8/17/08							
8/18/08	24	75	90	6.1	2.6	1.3	1.4
8/19/08	32.368	76	89	6.2	2.9	1.4	1.1
8/20/08	17.9	76	91	5.0	2.0	1.0	1.3
8/21/08	25.976	74	89	6.3	2.8	1.4	1.4
8/22/08	22.283	75	90	5.8	2.5	1.2	1.4
8/23/08							
8/24/08							
8/25/08	27.93	76	87	4.8	2.2	1.1	1.0
8/26/08	25.29	74	88	5.8	2.5	1.2	1.3
8/27/08	22.681	74	89	5.8	2.5	1.2	1.4
8/28/08	30.242	74	88	6.4	2.9	1.5	1.3
8/29/08	28.817	75	88	5.8	2.6	1.3	1.1
8/30/08							
8/31/08							

ATTACHMENT 35

Comparison of Monthly Temperature Data Collected at Fixed Station BD-1 to Warm water (WW) and Cold water (CW) Temperature Criteria in Degrees Fahrenheit (°F)

Year	January	February	March	April	May	June	July	August	September	October	November	December
1990	42.3	39.4	47.6	--	60.0	63.1	77.0	71.6	66.7	68.5	51.8	--
1991	40.8	41.0	43.3	--	67.1	77.9	--	83.4	65.7	61.1	--	--
1992	46.9	43.9	46.9	53.6	63.0	64.2	75.2	65.7	73.8	--	--	--
1993	40.3	45.2	44.2	44.6	60.6	--	--	76.3	66.2	57.1	--	--
1994	--	--	48.0	64.1	--	60.7	--	75.5	--	62.6	59.6	--
1995	37.7	--	40.3	53.2	61.5	74.8	74.7	--	75.1	59.1	40.4	39.6
1996	36.4	37.2	39.4	52.0	68.4	71.3	76.3	74.2	70.3	57.9	44.9	43.6
1997	--	38.5	--	57.9	60.2	66.4	72.6	70.7	67.4	55.1	43.6	47.5
1998	--	41.4	47.3	55.7	--	73.8	77.7	--	72.5	63.0	54.3	48.0
1999	37.8	39.9	47.5	54.8	67.5	70.9	80.8	78.4	58.6	56.3	50.0	46.7
2000	40.6	41.3	51.8	57.2	65.8	74.3	74.3	73.4	71.8	64.9	42.1	39.5
2001	41.7	35.2	45.8	59.5	72.7	61.7	78.3	78.1	66.6	62.6	59.3	51.8
2002	47.5	44.9	46.4	68.9	60.6	73.2	81.5	76.7	75.2	66.7	51.1	45.5
2003	44.1	40.5	37.4	47.5	58.6	62.1	75.7	77.5	70.7	60.1	54.5	41.4
2004	39.6	41.4	46.0	52.9	68.7	64.2	74.8	73.9	73.6	60.4	55.2	41.5
2005	42.3	41.7	50.4	60.6	67.1	77.9	75.7	81.5	80.1	64.9	55.2	35.1
2006	43.9	43.2	54.5	54.1	57.0	71.8	77.9	73.6	65.5	66.9	48.7	35.6
2007	33.8	36.7	46.8	43.9	73.8	75.6	76.3	70.4	76.9	64.0	39.4	39.6
2008	42.0	34.3	45.3	47.4	58.6	72.9	74.5	78.1	70.7	50.8	39.1	39.8
WW Std.	**50**	**50**	**60**	**70**	**80**	**90**	**90**	**90**	**90**	**78**	**70**	**57**
CW Std.	**65**	**65**	**65**	**65**	**65**	**70**	**70**	**70**	**65**	**65**	**65**	**65**
Count	**16**	**17**	**18**	**17**	**17**	**18**	**16**	**17**	**18**	**18**	**16**	**14**
Maximum	**47.5**	**45.2**	**54.5**	**68.9**	**73.8**	**77.9**	**81.5**	**83.4**	**80.1**	**68.5**	**59.6**	**51.8**
Minimum	**33.8**	**34.3**	**37.4**	**43.9**	**57.0**	**60.7**	**72.6**	**65.7**	**58.6**	**50.8**	**39.1**	**35.1**
# > WW Std.	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
# > CW Std.	**0**	**0**	**0**	**1**	**8**	**11**	**16**	**16**	**17**	**3**	**0**	**0**
% > CW Std.	**0**	**0**	**0**	**5.9**	**47**	**61**	**100**	**94**	**94**	**17**	**0**	**0**